## APPENDIX D COST ESTIMATES

Note that pre-design as appropriate.	sampling costs have b	peen assumed to be	included in remedi	al design costs,

## APPENDIX D-1 SW ALTERNATIVE COST ESTIMATES

## Appendix D-1a

**Cost Estimates for Alternative SW-2** 

#### Cost Estimate Summary for Alternative SW-2: Limited Action Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### CAPITAL COSTS

Subtotal, Annual O&M Activities with Contingencies	\$120,000
Bid Contingency (15% Annual O&M Activities Subtotal)	\$14,000
Scope Contingency (15% Annual O&M Activities Subtotal)	\$14,000
Subtotal, Annual O&M Activities	\$93,000
Subtotal, Groundwater and Surface Water Monitoring	\$83,000
Contractor	\$9,600
Laboratory	\$13,000
Subtotal, Engineer	\$60,000
Investigation-Derived Waste Disposal	\$2,000
Sampling Event	\$46,000
Water Level Gauging Event	\$3,900
Preparation/Mobilization/Demobilization	\$8,600
Groundwater and Surface Water Monitoring Engineer	
	, -
Subtotal, Annual Maintenance/Repair Activities	\$10,434
Engineer	\$3,013 \$7,419
Annual Maintenance/Repair Activities  Contractor	\$3,015
O&M Activities	
ANNUAL O&M COSTS	
TOTAL, CAPITAL COSTS	\$90,000
Subtotal, Establish Deed Restrictions	\$50,000
Establish Deed Restrictions	\$50,000
Institutional Controls	
Subtotal, Professional/Technical Services	\$14,000
Construction Management (15% Construction Activities Subtotal w/Contingencies)	\$4,500
Remedial Design (20% Construction Activities Subtotal w/Contingencies)	\$6,000
Project Management (10% Construction Activities Subtotal w/Contingencies)	\$3,000
Professional/Technical Services	
Subtotal, Construction Activities with Contingencies	\$30,000
Bid Contingency (15% Construction Activities Subtotal)	\$3,800
Scope Contingency (15% Construction Activities Subtotal)	\$3,800
Subtotal, Construction Activities	\$25,000
Post-Construction Submittals/As-Builts	\$5,000
Subtotal, Install Security Fence	\$10,000
Contractor	\$10,000
Install Security Fence	
Implementation Plans/Submittals	\$10,000
Construction Activities	

#### Cost Estimate Summary for Alternative SW-2: Limited Action Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

Professional/Technical Services	
Project Management (10% Annual O&M Activities Subtotal w/Contingencies)	\$12,000
Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)	\$18,000
Subtotal, Professional/Technical Services	\$30,000
TOTAL, ANNUAL O&M COSTS	\$150,000
PERIODIC COSTS	
Construction/O&M	
Every 5 Years O&M Activities	
Periodic Maintenance/Repair Activities (every 5 years)	
Contractor	
Monitoring Well Decommisioning & Replacement	\$9,800
Maintain/Repair Security Fence	\$8,200
Update Elevation Survey	\$2,800
Subtotal, Contractor	\$21,000
Engineer	\$9,900
Subtotal, Periodic Maintenance/Repair Activities (every 5 years)	\$31,000
Subtotal, Every 5 Years O&M Activities	\$31,000
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)	\$4,700
Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)	\$4,700
Subtotal, Every 5 Year O&M Activities with Contingencies	\$40,000
Year 100 Construction/O&M Activities	
Decomissioning of Monitoring Network (year 100 only)	
Contractor	\$82,000
Engineer	\$68,000
Subtotal, Decomissioning of Monitoring Network (year 100 only)	\$150,000
Subtotal, Year 100 Construction/O&M Activities	\$150,000
Scope Contingency (15% of Year 100 O&M Activities Subtotal)	\$23,000
Bid Contingency (15% of Year 100 O&M Activities Subtotal)	\$23,000
Subtotal, Year 100 Construction/O&M Activities with Contingencies	\$200,000
Subtotal, Periodic Construction/O&M Costs	\$240,000
Professional/Technical Services	
Project Management (10% of Periodic O&M Subtotal w/Contingencies)	\$24,000
Technical Support (15% of Periodic O&M Subtotal w/Contingencies)	\$36,000
Five-Year Review	\$13,000
Subtotal, Professional/Technical Services	\$73,000

TOTAL, PERIODIC COSTS

\$310,000

#### Cost Estimate Summary for Alternative SW-2: Limited Action Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### PRESENT VALUE ANALYSIS

Type of Cost	Year	Total Cost	Total Cost Per Year	Discount Factor	Present Value
Capital Costs	0	\$90,000	\$90,000	1	\$90,000
Annual O&M Costs	1-100	\$15,000,000	\$150,000	14.3	\$2,140,000
Periodic Costs	5	\$63,000	\$63,000	0.713	\$45,000
Periodic Costs	10	\$63,000	\$63,000	0.508	\$32,000
Periodic Costs	15	\$63,000	\$63,000	0.362	\$22,800
Periodic Costs	20	\$63,000	\$63,000	0.258	\$16,300
Periodic Costs	25	\$63,000	\$63,000	0.184	\$11,600
Periodic Costs	30	\$63,000	\$63,000	0.131	\$8,300
Periodic Costs	35	\$63,000	\$63,000	0.0937	\$5,900
Periodic Costs	40	\$63,000	\$63,000	0.0668	\$4,200
Periodic Costs	45	\$63,000	\$63,000	0.0476	\$3,000
Periodic Costs	50	\$63,000	\$63,000	0.0339	\$2,140
Periodic Costs	55	\$63,000	\$63,000	0.0242	\$1,520
Periodic Costs	60	\$63,000	\$63,000	0.0173	\$1,090
Periodic Costs	65	\$63,000	\$63,000	0.0123	\$770
Periodic Costs	70	\$63,000	\$63,000	0.00877	\$550
Periodic Costs	75	\$63,000	\$63,000	0.00625	\$390
Periodic Costs	80	\$63,000	\$63,000	0.00446	\$280
Periodic Costs	85	\$63,000	\$63,000	0.00318	\$200
Periodic Costs	90	\$63,000	\$63,000	0.00227	\$143
Periodic Costs	95	\$63,000	\$63,000	0.00162	\$102
Periodic Costs	100	\$310,000	\$310,000	0.00115	\$357

TOTAL PRESENT VALUE OF ALTERNATIVE

\$2,400,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

## TABLE D-1a.2 Detailed Cost Estimate for

Revision No.: 01 - DRAFT

Date: October 2007

#### Alternative SW-2: Limited Action Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**SW-2: Limited Action** 

-2: Limited Action		***			
SCRIPTION	OTV	UNIT COSTS	UNITS	COST	COMMENTS/DEFEDENCE
PITAL COSTS	QTY	COSIS	UNIIS	COST	COMMENTS/REFERENCE
Construction Activities					
Implementation Plans/Submittals	1	\$10,000	Ea.	\$10,000	SHA estimate
<b>r</b>		, .,		+,	
Install Security Fence					
Contractor					
Clearing, Medium Brush with Average Grub &	0.5	\$1,254	Acre	\$627	ECHOS 17 01 0103; Assumes distance of 246 feet by
Some Trees					20 feet wide will be cleared at same level of effort as (
					acre.
Fence, chain link industrial, schedule 40, 2"	250	\$36	L.F.	\$9,000	Means 32 31 13.20 0500
posts @ 10' O.C., set in concrete, 6' H, 3 strands					
barb wire, 6 ga. wire, galv. steel					
Gate for 6' high fence, 1-5/8" frame, 3' wide, galv.	1	\$358	Fa	\$358	Means 32 31 13.20 1400
steel	1	φσσσ	2	4550	
		Subtotal,	Contractor	\$10,000	\$9,985
Si	ubtotal, l	Install Secu	rity Fence	\$10,000	\$9,985
Post-Construction Submittals/As-Builts	1	\$5,000	Ea.	\$5,000	SHA estimate
Sul	btotal. C	onstructio	1 Activities	\$25,000	
34.	<b>510111</b> , C		11100111000	Ψ20,000	
Scope Contingency (15% Construction Activities				\$3,800	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal) Bid Contingency (15% Construction Activities Subtotal)				\$3,800	OSWER 5-6: Assume 15% of Construction Activities
Dia Contingency (15% Construction Activities Subtotal)				φ3,000	Subtotal
Subtotal, Construction	Activitie	es with Co	ntingencies	\$30,000	
Professional/Technical Services					
Project Management (10% Construction Activities				\$2,000	OSWER 5-8: Assume 10% of Construction Activities
Subtotal w/Contingencies)				\$3,000	Subtotal including contingencies
				\$6,000	
Remedial Design (20% Construction Activities Subtotal				\$6,000	OSWER 5-8: Assume 20% of Construction Activities
w/Contingencies)				\$4.500	Subtotal including contingencies
Construction Management (15% Construction				\$4,500	OSWER 5-8: Assume 15% of Construction Activities
Activities Subtotal w/Contingencies)  Subtotal, Pr	rofession	al/Technic	al Services	\$14,000	Subtotal including contingencies
Subtotal, 11	orcssion	ai/ I cellific	ai Sci vices	φ14,000	
Institutional Controls					
<b>Establish Deed Restrictions</b>					
Engineer					
Establish Institutional Controls in the form of Deed	10	\$5,000	Ea	\$50,000	SHA estimate; Costs estimated based on number of
Restrictions		40,000		400,000	properties requiring deed restrictions.
Restretions					properties requiring deed resuretions.
		Subtota	l, Engineer	\$50,000	\$50,000
Subtota	ıl Establ	ish Deed R	estrictions	\$50,000	\$50,000
				,	**,
Si	ubtotal, l	Institution	al Controls	\$50,000	
	TOTA	L, CAPITA	AL COSTS	\$90,000	1
		,	[	,,-	4

#### **TABLE D-1a.2 Detailed Cost Estimate for Alternative SW-2: Limited Action**

#### **Feasibility Study** Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**SW-2: Limited Action** 

DESCRIPTION ANNUAL

UNIT

\$3,366 Based on 2006 Sampling Round Costs.

\$505 Assume 15% of labor cost

Revision No.: 01 - DRAFT

Date: October 2007

D&M COSTS Activities Annual Maintenance/Repair Activities	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Contractor					
Clearing, Medium Brush with Average Grub & Some Trees	1	\$1,254	Acre	\$1,254	ECHOS 17 01 0103; Assumes access paths to/frr areas around monitoring points will be cleared at level of effort as one acre.
Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06
Day Rate, Truck-Mounted Drill Rig	1	\$1,275			Environmetal Drilling (EDI) Invoice dated 11/06
2" Expansion Plug	2	\$20	-		Environmetal Drilling (EDI) Invoice dated 11/06
80# Concrete Mix	2	\$18			Environmetal Drilling (EDI) Invoice dated 11/06
8" Manhole, water-tight, traffic-rated	2	\$75			Environmetal Drilling (EDI) Invoice dated 11/06
			Contractor	\$3,015	g( / / / / / / / / / / / / / / / / / / /
Engineer					
Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average ra \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protecti	1	\$594	L.S.	\$594	Assume 15% of field labor cost.
		¢124	II.	\$2.728	See Note 3.
Labor, Annual Summary Report Preparation	22	\$124	п.		See Note 5.
Labor, Annual Summary Report Preparation Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma	1	\$137 Subtotal	L.S. , Engineer		Assume 5% of report preparation labor cost.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma	1	\$137 Subtotal	L.S. , Engineer	\$137 \$7,419	
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma Groundwater and Surface Water Monitoring  Engineer	1	\$137 Subtotal	L.S. , Engineer	\$137 \$7,419	
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma	1	\$137 Subtotal	L.S. , Engineer Activities	\$137 \$7,419 \$10,434	
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma Groundwater and Surface Water Monitoring  Engineer  Preparation/Mobilization/Demobilization	1 nintena	\$137  Subtotal  nce/Repair	L.S. , Engineer Activities	\$137 \$7,419 <b>\$10,434</b> \$5,148	Assume 5% of report preparation labor cost.  SHA estimate, unit cost based on 2006 Site moni
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma  Groundwater and Surface Water Monitoring  Engineer  Preparation/Mobilization/Demobilization  Labor  Truck rental	1 mintena	\$137  Subtotal  nce/Repair  \$99  \$70	L.S. , Engineer Activities Hr.	\$137 \$7,419 <b>\$10,434</b> \$5,148 \$840	Assume 5% of report preparation labor cost.  SHA estimate, unit cost based on 2006 Site monievent
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma Groundwater and Surface Water Monitoring  Engineer  Preparation/Mobilization/Demobilization  Labor  Truck rental  Portable Storage Unit Rental	1 anintena 52 12	\$137  Subtotal  nce/Repair  \$99  \$70 \$165	L.S. , Engineer Activities  Hr. Day Month	\$137 \$7,419 \$10,434 \$5,148 \$840 \$165	Assume 5% of report preparation labor cost.  SHA estimate, unit cost based on 2006 Site monievent Assumes Penskee 16' box truck rental. SHA estimate, based on experience.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma Groundwater and Surface Water Monitoring  Engineer  Preparation/Mobilization/Demobilization  Labor  Truck rental	1 anintena 52 12 1	\$137  Subtotal  nce/Repair  \$99  \$70 \$165 \$175	L.S. , Engineer Activities Hr.	\$137 \$7,419 \$10,434 \$5,148 \$840 \$165 \$263	SHA estimate, unit cost based on 2006 Site monievent Assumes Penskee 16' box truck rental. SHA estimate, based on experience. SHA estimate, based on experience.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma Groundwater and Surface Water Monitoring  Engineer  Preparation/Mobilization/Demobilization  Labor  Truck rental  Portable Storage Unit Rental  Portable Eyewash Station	52 12 1.5	\$137  Subtotal  nce/Repair  \$99  \$70 \$165 \$175 \$55	Hr. Day Month Week	\$137 \$7,419 \$10,434 \$5,148 \$840 \$165 \$263 \$220	SHA estimate, unit cost based on 2006 Site monievent Assumes Penskee 16' box truck rental. SHA estimate, based on experience. SHA estimate, based on experience. N.E. Environmental Solutions, Inc. 2006 Fee Sch
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma Groundwater and Surface Water Monitoring  Engineer Preparation/Mobilization/Demobilization  Labor  Truck rental Portable Storage Unit Rental Portable Eyewash Station  55-gallon steel drums	52 12 1.5 4	\$137  Subtotal nce/Repair  \$99  \$70 \$165 \$175 \$55 \$60	Hr.  Day Month Week Ea.	\$137 \$7,419 \$10,434 \$5,148 \$840 \$165 \$263 \$220 \$120	Assume 5% of report preparation labor cost.  SHA estimate, unit cost based on 2006 Site monievent Assumes Penskee 16' box truck rental. SHA estimate, based on experience.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Annual Ma  Groundwater and Surface Water Monitoring  Engineer  Preparation/Mobilization/Demobilization  Labor  Truck rental  Portable Storage Unit Rental  Portable Eyewash Station  55-gallon steel drums  55-gallon poly drums	52 12 1 1.5 4	\$137  Subtotal nce/Repair  \$99  \$70 \$165 \$175 \$55 \$60	Hr. Day Month Week Ea. Ea.	\$137 \$7,419 \$10,434 \$5,148 \$840 \$165 \$263 \$220 \$120	SHA estimate, unit cost based on 2006 Site monievent Assumes Penskee 16' box truck rental. SHA estimate, based on experience. SHA estimate, based on experience. N.E. Environmental Solutions, Inc. 2006 Fee Sch. N.E. Environmental Solutions, Inc. 2006 Fee Sch.

Subtotal, Water Level Gauging Event \$3,900 \$3,871

\$99 Ea.

\$505 L.S.

Labor

equipment, etc.)

**Water Level Gauging Event** 

Misc. Expenses (e.g. mileage. telephone,

reproduction, postage, personal protective

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Revision No.: 01 - DRAFT Date: October 2007

# TABLE D-1a.2 Detailed Cost Estimate for Alternative SW-2: Limited Action Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**SW-2: Limited Action** 

1 1 2	\$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$300	Wk. Ea. Wk. Wk. Wk. Wk. Wk. Wk. Ft. Ft. Ft. Ft. Ea. Ea.	\$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000 \$33 \$29 \$135 \$44,875 \$46,000 \$860 \$260	event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check balls rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience.  SHA estimate, based on experience.  SHA estimate, based on experience.  SHA estimate, based on experience.  NE. Environmental Solutions, Inc. 2006 Fee Sche N.E. Environmental Solutions, Inc. 2006 Fee Sche N.E. Environmental Solutions, Inc. 2006 Fee Sche
4.5 20 4.5 4.5 4.5 4.5 6.5 4.5 1000 20 20 1.5 1 Subte	\$160 \$45 \$325 \$245 \$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$300	Wk. Ea. Wk. Wk. Wk. Wk. Wk. Ft. Ft. Ft. Ea. Ea.	\$720 \$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000 \$33 \$29 \$135 \$4,875 \$46,000 \$860 \$260	event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check balls rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheller. N.E. Environmental Solutions, Inc. 2006 Fee Scheller. N.E. Environmental Solutions, Inc. 2006 Fee Scheller.
20 4.5 4.5 4.5 4.5 4.5 6.5 4.5 1000 20 1.5 1 Subte	\$45 \$325 \$245 \$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875  otal, Samp \$215 \$260 \$230 \$300	Ea.  Wk. Wk. Wk. Wk. Wk. Wk. Ft. Ft. Ft. Ea.  Ea.  Ea.	\$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000 \$33 \$29 \$135 \$44,875 \$46,000 \$860 \$260	HAS estimate; Includes teflon bladder, check balls rings and grab plates.  SHA estimate, Assumes YSI 556 unit.  SHA estimate, based on experience.  SHA estimate, based on experience.  SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit.  SHA estimate, based on experience.  NEL Environmental Solutions, Inc. 2006 Fee Scheller.  N.E. Environmental Solutions, Inc. 2006 Fee Scheller.  N.E. Environmental Solutions, Inc. 2006 Fee Scheller.
20 4.5 4.5 4.5 4.5 4.5 6.5 4.5 1000 20 1.5 1 Subte	\$45 \$325 \$245 \$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875  otal, Samp \$215 \$260 \$230 \$300	Ea.  Wk. Wk. Wk. Wk. Wk. Wk. Ft. Ft. Ft. Ea.  Ea.  Ea.	\$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000 \$33 \$29 \$135 \$44,875 \$46,000 \$860 \$260	HAS estimate; Includes teflon bladder, check balls rings and grab plates.  SHA estimate, Assumes YSI 556 unit.  SHA estimate, based on experience.  SHA estimate, based on experience.  SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit.  SHA estimate, based on experience.  Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Sche  N.E. Environmental Solutions, Inc. 2006 Fee Sche  N.E. Environmental Solutions, Inc. 2006 Fee Sche
4.5 4.5 4.5 4.5 6.5 1000 20 20 1.5 1 Subte	\$325 \$245 \$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$300	Wk. Wk. Wk. Wk. Wk. Wk. Ft. Ft. Ft. L.S.	\$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000 \$33 \$29 \$135 \$4,875 \$46,000 \$860 \$260	rings and grab plates.  SHA estimate, Assumes YSI 556 unit.  SHA estimate, based on experience.  SHA estimate; based on experience.  SHA estimate; Assumes MP30 Drawdown Meter  SHA estimate; Assumes HACH 2100P unit.  SHA estimate, based on experience.  NEL Environmental Solutions, Inc. 2006 Fee Scheller.  N.E. Environmental Solutions, Inc. 2006 Fee Scheller.  N.E. Environmental Solutions, Inc. 2006 Fee Scheller.
4.5 4.5 4.5 4.5 6.5 1000 20 20 1.5 1 Subte	\$245 \$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$300	Wk. Wk. Wk. Wk. Wk. Ft. Ft. Ft. Shing Event  Ea. Ea.	\$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000 \$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260	SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheet N.E. Environmental Solutions
4.5 4.5 4.5 4.5 6.5 1000 20 20 1.5 1 Subte	\$245 \$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$300	Wk. Wk. Wk. Wk. Wk. Ft. Ft. Ft. Shing Event  Ea. Ea.	\$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000 \$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260	SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheet N.E. Environmental Solutions
4.5 4.5 4.5 6.5 1000 20 20 1.5 1 Subte	\$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$300 <b>rived Was</b>	Wk. Wk. Wk. Wk. Ft. Ft. Ft. L.S.	\$383 \$450 \$405 \$163 \$1,755 \$1,000 \$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260	SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheet N.E. Environmental Solutions
4.5 4.5 6.5 4.5 1000 20 20 1.5 1 Subte	\$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$230 \$300	Wk. Wk. Wk. Ft. Ft. Ft. Wk. L.S.	\$450 \$405 \$163 \$1,755 \$1,000 \$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260	SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheen. N.E. Environmental Solutions, Inc. 2006 Fee Scheen. N.E. Environmental Solutions, Inc. 2006 Fee Scheen.
4.5 6.5 4.5 1000 20 20 1.5 1 Subto	\$90 \$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$230 \$300	Wk. Wk. Wk. Ft. Ft. Ft. Wk. L.S.	\$405 \$163 \$1,755 \$1,000 \$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260	SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheen. N.E. Environmental Solutions, Inc. 2006 Fee Scheen. N.E. Environmental Solutions, Inc. 2006 Fee Scheen.
6.5 4.5 1000 20 20 1.5 1 Subte	\$25 \$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 otal, Samp \$215 \$260 \$300	Wk. Wk. Ft. Ft. Ft. Wk. L.S.	\$1,755 \$1,000 \$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260	SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
4.5 i 1000 20 20 1.5 1 Subte	\$390 \$1.00 \$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$230 \$300	Wk. Ft. Ft. Ft. Wk. L.S.  Dling Event  Ea. Ea.	\$1,755 \$1,000 \$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260	SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
1000 20 20 1.5 1 Subte	\$1.00 \$0.15 \$1.45 \$90 \$4,875 otal, Samp \$215 \$260 \$230 \$300	Ft. Ft. Wk. L.S.  Dling Event  Ea. Ea. Ea.	\$1,000 \$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260	SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
20 20 1.5 1 Subte	\$0.15 \$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$230 \$300 <b>rived Was</b>	Ft. Ft. Wk. L.S.  Ling Event  Ea. Ea. Ea.	\$3 \$29 \$135 \$4,875 \$46,000 \$860 \$260 \$230	SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheol. N.E. Environmental Solutions, Inc. 2006 Fee Scheol. N.E. Environmental Solutions, Inc. 2006 Fee Scheol.
20 1.5 1 Subte	\$1.45 \$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$230 \$300 <b>rived Was</b>	Ft. Wk. L.S.  Dling Event  Ea.  Ea.  Ea.	\$29 \$135 \$4,875 \$46,000 \$860 \$260 \$230	SHA estimate, based on experience. SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
1.5 1 Subto	\$90 \$4,875 <b>otal, Samp</b> \$215 \$260 \$230 \$300 <b>rived Was</b>	Wk. L.S.  Dling Event  Ea.  Ea.  Ea.	\$135 \$4,875 \$46,000 \$860 \$260 \$230	SHA estimate, based on experience. Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
Subto 4 1 1 2	\$4,875  otal, Samp  \$215  \$260  \$230  \$300  rived Wast	Ea. Ea. Ea.	\$4,875 \$46,000 \$860 \$260 \$230	Assumes 15% of labor cost.  \$45,882  N.E. Environmental Solutions, Inc. 2006 Fee Scheon.  N.E. Environmental Solutions, Inc. 2006 Fee Scheon.  N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
Subto 4 1 1 2 2	\$215 \$260 \$230 \$300	Ea. Ea. Ea.	\$46,000 \$860 \$260 \$230	N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
1 1 2	\$215 \$260 \$230 \$300	Ea. Ea. Ea.	\$860 \$260 \$230	N.E. Environmental Solutions, Inc. 2006 Fee Scheon.  N.E. Environmental Solutions, Inc. 2006 Fee Scheon.  N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
1 1 2	\$260 \$230 \$300 rived Wast	Ea. Ea.	\$260 \$230	N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
1 1 2	\$260 \$230 \$300 rived Wast	Ea. Ea.	\$260 \$230	N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
1 1 2	\$260 \$230 \$300 rived Wast	Ea. Ea.	\$260 \$230	N.E. Environmental Solutions, Inc. 2006 Fee Scheon. N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
1 2	\$230 \$300 rived Was	Ea.	\$230	N.E. Environmental Solutions, Inc. 2006 Fee Scheo
2	\$300	Ea.		N.E. Environmental Solutions, Inc. 2006 Fee Scheon.  N.E. Environmental Solutions, Inc. 2006 Fee Scheon.
	rived Was		\$600	N.E. Environmental Solutions, Inc. 2006 Fee Scheo
ation-De		te Disposal		
ation De		te Disposar	\$2,000	\$1,950
		l, Engineer	\$60,000	\$60,332
		, ,	, ,	
	****	_	** ***	
35	\$110	Ea.	\$3,850	Alpha Woods Hole Labs 2006/2007 lab fees; See N
				4.
35	\$155	Ea.	\$5,425	Alpha Woods Hole Labs 2006/2007 lab fees; See N
266	\$13	Fa	\$3.458	4. Alpha Woods Hole Labs 2006/2007 lab fees; See N
200	Ψ13	Lu.	ψ5,430	4.
7	\$75	Day	\$525	Alpha Woods Hole Labs 2006/2007 lab fees.
1	\$127	L.S.	\$127	Assume 1 percent of total lab fees.
			\$13,000	
20	<b>#</b>	N T	<b></b>	N. Paris and IVI
33	\$290	Location	\$9,570	New Environmental Horizons, Inc. costs from 2006 Unit cost based on number of sampling locations.
	G 1		do 500	¢0.570
	Subtotal,	contractor	\$9,600	\$9,570
ıd Surfac	ce Water N	Monitoring	\$83,000	\$83,287
total, An	nual O&M	I Activities	\$93,000	
			\$14,000	OSWER 5-6: Assume 15% of Annual O&M Activi
			\$14,000	
	33	1 \$127 Subtotal, I  33 \$290 Subtotal, ond Surface Water M	1 \$127 L.S. Subtotal, Laboratory	1 \$127 L.S. \$127   \$13,000   \$13,000   \$13,000   \$13,000   \$13,000   \$13,000   \$13,000   \$10,0

## TABLE D-1a.2 Detailed Cost Estimate for Alternative SW-2: Limited Action Feasibility Study

Revision No.: 01 - DRAFT

Date: October 2007

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**SW-2: Limited Action** 

		UNIT			
DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% Annual O&M Activities				\$12,000	OSWER 5-8: Assume 10% of Annual O&M Subtotal
Subtotal w/Contingencies)					including contingencies
Technical Support (15% Annual O&M Activities				\$18,000	OSWER 5-8: Assume 15% of Annual O&M Subtotal
Subtotal w/Contingencies)					including contingencies
Subtota	l, Profession	al/Technica	al Services	\$30,000	

TOTAL, ANNUAL O&M COSTS \$150,000

#### PERIODIC COSTS

Construction/O&M

Every 5 Years O&M Activities

ntractor					
Monitoring Well Decommisioning & Replacement					
Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	5	\$1,275	Day		Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC Well Screen	20	\$5.50	L.F.	\$110	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC Well Riser	80	\$4.00	L.F.	\$320	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC End Point	2	\$7.25	Ea.	\$15	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" Expansion Plug	2	\$20	Ea.	\$40	Environmetal Drilling (EDI) Invoice dated 11/06/03
Filter Pack, silica sand	80	\$1.10	L.F.	\$88	Environmetal Drilling (EDI) Invoice dated 11/06/03
Bentonite	4	\$32	L.F.	\$128	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	180	\$5	L.F.	\$900	Environmetal Drilling (EDI) Invoice dated 11/06/03
80# Concrete Mix	6	\$18	Ea.		Environmetal Drilling (EDI) Invoice dated 11/06/03
8" Manhole, water-tight, traffic-rated	6	\$75	Ea.		Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Roller Bit Wear, per foot	30	\$25	L.F.	\$750	Environmetal Drilling (EDI) Invoice dated 11/06/03
Drum, 55-gallon steel	1	\$55	Ea.	\$55	N.E. Environmental Solutions, Inc. 2006 Fee Schedul
Drum Transportation & Disposal, Non-Regulated So	1	\$180	Ea.	\$180	N.E. Environmental Solutions, Inc. 2006 Fee Schedu
Subtotal, M	onitorin	placement	\$9,800	\$9,779	
Maintain/Repair Security Fence					
Fence, chain link industrial, schedule 40, 2"	228	\$36	L.F.	\$8,208	Means 32 31 13.20 0500; Assumes 10% of security
posts @ 10' O.C., set in concrete, 6' H, 3 strands					fence is repaired every 5 years.
barb wire, 6 ga. wire, galv. steel					
Subtotal, Mai	ntain/Ro	epair Secu	rity Fence	\$8,200	\$8,208
,		•	•		
Update Elevation Survey					
	1	\$2,023	Dav	\$2,023	ECHOS 99 04 1201
Surveying, 2-person Crew	1				
7 0 1				\$2,800	\$2,773
7 0 1	tal, Upda	ate Elevat	ion Survey	\$2,800 \$21,000	\$2,773 \$20,759
7 0 1	tal, Upda	ate Elevat			
7 0 1	tal, Upda	ate Elevat	ion Survey		
Subto	tal, Upda	ate Elevat Subtotal, (	ion Survey	\$21,000	
Subton Squineer  Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	tal, Upda	ate Elevat Subtotal, (	ion Survey Contractor	\$21,000 \$5,445	\$20,759
Subton Squineer  Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	55 1	subtotal, (************************************	Ea. L.S.	\$21,000 \$5,445 \$817	\$20,759  See Note 3. Assumes 15% of oversight labor cost.
Subton  Sigineer  Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation	55 1	subtotal, (************************************	Ea. L.S. Hr.	\$21,000 \$5,445 \$817 \$3,472	\$20,759  See Note 3. Assumes 15% of oversight labor cost.  See Note 3.
Subton Squineer  Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	55 1	subtotal, (************************************	Ea. L.S. Hr.	\$21,000 \$5,445 \$817 \$3,472	\$20,759  See Note 3. Assumes 15% of oversight labor cost.

#### TABLE D-1a.2 Detailed Cost Estimate for

Revision No.: 01 - DRAFT

Date: October 2007

#### Alternative SW-2: Limited Action Feasibility Study

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**SW-2: Limited Action** 

TION	ОТУ	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Subtotal, E	very 5 Y			\$31,000	
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)				\$4,700	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)				\$4,700	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Every 5 Year O&M	Activities	s with Con	tingencies	\$40,000	
V 100 G 4 4 40 100 W 1 42 42					
Year 100 Construction/O&M Activities					
Decomissioning of Monitoring Network (year 100 only)					
becomissioning of Monitoring Network (year 100 only)					
Contractor					
Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	54	\$1,275	Day	\$68,850	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	2,700	\$5	L.F.	\$13,500	Environmetal Drilling (EDI) Invoice dated 11/06/03
		Subtotal, (	Contractor —	\$82,000	\$82,350
Engineer					
Engineer  Labor, Oversight	594	\$99	Hr.	\$58,806	See Note 3.
	594 1	\$99 \$8,821		,	See Note 3. Assume 15% of labor cost
Labor, Oversight	594			,	
Labor, Oversight Misc. Expenses (e.g. mileage. telephone,	594			,	
Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective	594	\$8,821		,	
Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	\$8,821 Subtotal	L.S.	\$8,821 \$68,000	Assume 15% of labor cost \$67,627
Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective	1	\$8,821 Subtotal	L.S.	\$8,821	Assume 15% of labor cost
Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1 ring Netv	\$8,821  Subtotal work (year	L.S. , Engineer	\$8,821 \$68,000	Assume 15% of labor cost \$67,627
Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Subtotal, Decomissioning of Monito Subtotal, Year 100 (	1 ring Netv	\$8,821  Subtotal work (year	L.S. , Engineer	\$8,821 \$68,000 \$150,000 \$150,000	\$67,627 \$149,977
Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Subtotal, Decomissioning of Monito	1 ring Netv	\$8,821  Subtotal work (year	L.S. , Engineer	\$8,821 \$68,000 \$150,000	\$67,627 \$149,977
Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Subtotal, Decomissioning of Monito Subtotal, Year 100 O Scope Contingency (15% of Year 100 O&M Activities	1 ring Netv	\$8,821  Subtotal work (year	L.S. , Engineer	\$8,821 \$68,000 \$150,000 \$150,000	\$67,627 \$149,977 OSWER 5-6: Assume 15% of Year 100 O&M Activities

Subtotal, Periodic Construction/O&M Costs

\$240,000

Revision No.: 01 - DRAFT

Date: October 2007

#### Detailed Cost Estimate for

#### Alternative SW-2: Limited Action Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**SW-2: Limited Action** 

577-2. Elimited Action		UNIT			
DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% of Periodic O&M Subtotal				\$24,000	OSWER 5-8: Assume 10% of Periodic O&M Subtotal
w/Contingencies)					including contingencies
Technical Support (15% of Periodic O&M Subtotal				\$36,000	OSWER 5-8: Assume 15% of Periodic O&M Subtotal
w/Contingencies)					including contingencies
Five-Year Review  Engineer					
<i>Engineer</i> Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
	'	Subtotal	, Engineer	\$13,000	\$13,020
	Subtot	tal, Five-Ye	ear Review	\$13,000	\$13,020
Subtotal, P	rofession	al/Technica	al Services	\$73,000	
	TOTAL	, PERIOD	IC COSTS	\$310,000	

Abbreviations:

 $Ea. = each \hspace{1.5cm} L.F. = linear feet \hspace{1.5cm} M.S.F. = thousand \ square \ feet$ 

#### Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition. RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition. ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. "OSWER" refers exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," July 2000.
- 5. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

## Appendix D-1b

**Cost Estimates for Alternative SW-3** 

Note that this appendix includes costs from the Draft FS (SHA, 2007) for the alternative previously designated as SW-4. Only edits to the titles/headers were made for this version of the FS.

#### **Cost Estimate Summary for**

## Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### CAPITAL COSTS

Construction Activities         \$86,000           Installation of Groundwater Treatment System         \$210,000           Contractor         \$210,000           Instrumentation         \$54,000           Instrumentation         \$180,000           Electrical         \$180,000           Water Supply         \$16,000           Treatment Building         \$120,000           Subtotal, Contractor         \$570,000           Subtotal, Installation of Groundwater Treatment System         \$670,000           Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall         \$4,300           Contractor         \$4,300           Extraction Trench Excavation & Dewatering         \$36,000           Extraction Trench Construction & Backfill         \$4,500           Underground Piping Excavation         \$21,000           Surface Water Discharge Outfall         \$1,000           Soil Stabilization         \$37,000           Subtotal, Contractor         \$170,000           Subtotal, Contractor         \$170,000           Subtotal, Contractor         \$170,000           Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall         \$190,000           Subtotal, Construction Activities         \$90,000           <	PITAL COSTS	
Installation of Groundwater Treatment System	Construction Activities	
Contractor	Implementation Plans/Submittals	\$86,000
Treatment System Equipment Installation   \$54,000   161	Installation of Groundwater Treatment System	
Instrumentation	Contractor	
Electrical   \$18,000   \$16,000   \$16,000   \$10,000   \$	Treatment System Equipment Installation	\$210,000
Water Supply         \$16,000           Treatment Building         \$120,000           Subtotal, Contractor         \$570,000           Engineer         \$100,000           Subtotal, Installation of Groundwater Treatment System         \$670,000           Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall         \$4,300           Contractor         \$4,300           Mobilization/Demobilization         \$4,300           Extraction Trench Excavation & Dewatering         \$36,000           Extraction Trench Construction & Backfill         \$45,000           Underground Piping Excavation         \$21,000           Surface Water Discharge Outfall         \$10,000           Sulf Stabilization         \$92,43           Soil Stabilization         \$92,43           Soil Stabilization         \$97,000           Site Restoration         \$170,000           Site Restoration         \$170,000           Site Restoration         \$170,000           Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall         \$190,000           Post-Construction Submittals/As-Builts         \$43,000           Scope Contingency (15% of Construction Activities Subtotal)         \$150,000           Subtotal, Construction Activities with Contingencies	Instrumentation	\$54,000
Treatment Building Subtotal, Contractor	Electrical	\$180,000
Subtotal, Contractor         \$570,000           Engineer         \$100,000           Subtotal, Installation of Groundwater Treatment System         \$670,000           Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall         Contractor           Mobilization/Demobilization         \$4,300           Extraction Trench Excavation & Dewatering         \$36,000           Extraction Trench Construction & Backfill         \$45,000           Underground Piping Excavation         \$21,000           Underground Piping Excavation         \$3,100           Surface Water Discharge Outfall         \$10,000           Suif Stabilization         \$9,243           Transportation/Disposal         \$37,000           Site Restoration         \$79           Subtotal, Contractor         \$170,000           Engineer         \$25,000           Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall         \$190,000           Post-Construction Submittals/As-Builts         \$43,000           Subtotal, Construction Activities         \$990,000           Scope Contingency (15% of Construction Activities Subtotal)         \$150,000           Bid Contingency (15% of Construction Activities Subtotal)         \$13,000           Subtotal, Construction Activities with Contingencies)	Water Supply	\$16,000
Engineer         \$100,000           Subtotal, Installation of Groundwater Treatment System         \$670,000           Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall Contractor         \$4,300           Mobilization/Demobilization         \$4,300           Extraction Trench Excavation & Dewatering         \$36,000           Extraction Trench Construction & Backfill         \$45,000           Underground Piping Excavation         \$21,000           Underground Piping Placement & Backfill         \$11,000           Surface Water Discharge Outfall         \$10,000           Surface Water Discharge Outfall         \$37,000           Soil Stabilization         \$9,243           Transportation/Disposal         \$37,000           Site Restoration         \$170,000           Subtotal, Contractor         \$170,000           Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall         \$190,000           Post-Construction Submittals/As-Builts         \$43,000           Subtotal, Construction Activities         \$990,000           Scope Contingency (15% of Construction Activities Subtotal)         \$150,000           Bid Contingency (15% of Construction Activities Subtotal)         \$1,300,000           Subtotal, Construction Activities Subtotal WContingencies)         \$78	Treatment Building	\$120,000
Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall Contractor Mobilization/Demobilization Extraction Trench Excavation & Dewatering Extraction Trench Excavation & Dewatering Extraction Trench Construction & Backfill Underground Piping Excavation Underground Piping Placement & Backfill Surface Water Discharge Outfall Surface Water Discharge Outfall Surface Water Discharge Outfall Soil Stabilization	Subtotal, Contractor	\$570,000
Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall Contractor  Mobilization/Demobilization Extraction Trench Excavation & Dewatering Extraction Trench Construction & Backfill Underground Piping Excavation Underground Piping Excavation Underground Piping Placement & Backfill Surface Water Discharge Outfall Surface Water Discharge Outfall Soil Stabilization Soil Stabilization Soil Stabilization Site Restoration/Disposal Site Restoration/Disposal Site Restoration Subtotal, Contractor Engineer Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall Subtotal, Construction Submittals/As-Builts Subtotal, Construction Activities Subtotal, Construction Activities Subtotal) Scope Contingency (15% of Construction Activities Subtotal) Subtotal, Construction Activities with Contingencies Project Management (6% of Construction Activities Subtotal w/Contingencies) Remedial Design (12% of Construction Activities Subtotal w/Contingencies) Sendon Construction Management (6% of Construction Activities Subtotal w/Contingencies) Siloo,000 Construction Management (6% of Construction Activities Subtotal w/Contingencies) Siloo,000 Subtotal, Construction Management (6% of Construction Activities Subtotal w/Contingencies) Siloo,000 Construction Management (6% of Construction Activities Subtotal w/Contingencies) Siloo,000	Engineer	\$100,000
Contractor         Mobilization/Demobilization         \$4,300           Extraction Trench Excavation & Dewatering         \$36,000           Extraction Trench Construction & Backfill         \$45,000           Underground Piping Excavation         \$21,000           Underground Piping Placement & Backfill         \$3,100           Surface Water Discharge Outfall         \$10,000           Soil Stabilization         \$9,243           Transportation/Disposal         \$37,000           Site Restoration         \$79           Subtotal, Contractor         \$170,000           Engineer         \$25,000           Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall         \$190,000           Post-Construction Submittals/As-Builts         \$43,000           Subtotal, Construction Activities         \$990,000           Scope Contingency (15% of Construction Activities Subtotal)         \$150,000           Bid Contingency (15% of Construction Activities Subtotal)         \$150,000           Subtotal, Construction Activities with Contingencies         \$1,300,000           Professional/Technical Services         \$78,000           Project Management (6% of Construction Activities Subtotal w/Contingencies)         \$160,000           Construction Management (8% of Construction Activities Subtotal w/Contingencies)         \$100,000	Subtotal, Installation of Groundwater Treatment System	\$670,000
Mobilization/Demobilization         \$4,300           Extraction Trench Excavation & Dewatering         \$36,000           Extraction Trench Construction & Backfill         \$45,000           Underground Piping Excavation         \$21,000           Underground Piping Placement & Backfill         \$3,100           Surface Water Discharge Outfall         \$10,000           Soil Stabilization         \$9,243           Transportation/Disposal         \$37,000           Site Restoration         \$79           Subtotal, Contractor         \$170,000           Engineer         \$25,000           Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall         \$190,000           Post-Construction Submittals/As-Builts         \$43,000           Subtotal, Construction Activities         \$990,000           Scope Contingency (15% of Construction Activities Subtotal)         \$150,000           Bid Contingency (15% of Construction Activities Subtotal)         \$1,300,000           Subtotal, Construction Activities with Contingencies         \$1,300,000           Professional/Technical Services           Project Management (6% of Construction Activities Subtotal w/Contingencies)         \$78,000           Remedial Design (12% of Construction Activities Subtotal w/Contingencies)         \$160,000 <t< td=""><td></td><td>charge Outfall</td></t<>		charge Outfall
Extraction Trench Excavation & Dewatering         \$36,000           Extraction Trench Construction & Backfill         \$45,000           Underground Piping Excavation         \$21,000           Underground Piping Placement & Backfill         \$3,100           Surface Water Discharge Outfall         \$10,000           Soil Stabilization         \$9,243           Transportation/Disposal         \$37,000           Site Restoration         \$79           Subtotal, Contractor         \$170,000           Engineer         \$25,000           Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall         \$190,000           Post-Construction Submittals/As-Builts         \$43,000           Subtotal, Construction Activities         \$990,000           Scope Contingency (15% of Construction Activities Subtotal)         \$150,000           Bid Contingency (15% of Construction Activities Subtotal)         \$150,000           Subtotal, Construction Activities with Contingencies         \$1,300,000           Professional/Technical Services         \$78,000           Remedial Design (12% of Construction Activities Subtotal w/Contingencies)         \$160,000           Construction Management (6% of Construction Activities Subtotal w/Contingencies)         \$100,000		\$4.300
Extraction Trench Construction & Backfill         \$45,000           Underground Piping Excavation         \$21,000           Underground Piping Placement & Backfill         \$3,100           Surface Water Discharge Outfall         \$10,000           Soil Stabilization         \$9,243           Transportation/Disposal         \$790           Subtotal, Contractor         \$170,000           Engineer         \$25,000           Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall         \$190,000           Post-Construction Submittals/As-Builts         \$43,000           Subtotal, Construction Activities         \$990,000           Scope Contingency (15% of Construction Activities Subtotal)         \$150,000           Bid Contingency (15% of Construction Activities Subtotal)         \$150,000           Subtotal, Construction Activities with Contingencies         \$1,300,000           Professional/Technical Services         \$78,000           Project Management (6% of Construction Activities Subtotal w/Contingencies)         \$78,000           Remedial Design (12% of Construction Activities Subtotal w/Contingencies)         \$160,000           Construction Management (6% of Construction Activities Subtotal w/Contingencies)         \$100,000		
Underground Piping Excavation Underground Piping Placement & Backfill Surface Water Discharge Outfall Surface Water Discharge Outfall Soil Stabilization Soil Stabili	e e e e e e e e e e e e e e e e e e e	
Underground Piping Placement & Backfill Surface Water Discharge Outfall Soil Stabilization Soil Restoration Soil Restoration Soil Restoration Soultotal, Contractor Soultotal, Contractor Soultotal, Contractor Soultotal, Install Extraction Trench, System Piping, & Discharge Outfall Soultotal, Install Extraction Trench, System Piping, & Discharge Outfall Soultotal, Construction Submittals/As-Builts Soultotal, Construction Activities Soultotal, Construction Activities Soultotal, Construction Activities Subtotal) Soultotal, Construction Activities Subtotal Soultotal, Construction Activities with Contingencies Soultotal, Construction Activities With Contingencies Project Management (6% of Construction Activities Subtotal w/Contingencies) Remedial Design (12% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies) Soultotal Without Management (8% of Construction Activities Subtotal w/Contingencies)	Underground Piping Excavation	
Surface Water Discharge Outfall Soil Stabilization Soil Stabilization Soil Stabilization Site Restoration/Disposal Site Restoration Site Restoration Subtotal, Contractor Subtotal, Contractor Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall Subtotal, Construction Submittals/As-Builts Subtotal, Construction Activities Subtotal, Construction Activities Subtotal, Construction Activities Subtotal, Construction Activities Subtotal) Sid Contingency (15% of Construction Activities Subtotal) Subtotal, Construction Activities with Contingencies Subtotal, Construction Activities Subtotal w/Contingencies) Subtotal, Construction Activities Subtotal w/Contingencies) Subtotal Construction Activities Subtotal w/Contingencies) Subtotal Design (12% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies) Subtotal Construction Management (8% of Construction Activities Subtotal w/Contingencies)		
Soil Stabilization \$9,243 Transportation/Disposal \$37,000 Site Restoration \$79 Subtotal, Contractor \$170,000  Engineer \$25,000 Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall \$190,000  Post-Construction Submittals/As-Builts \$43,000  Subtotal, Construction Activities \$990,000 Scope Contingency (15% of Construction Activities Subtotal) \$150,000 Bid Contingency (15% of Construction Activities Subtotal) \$150,000 Subtotal, Construction Activities with Contingencies \$1,300,000  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies) \$78,000 Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000 Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000		\$10,000
Site Restoration \$79 Subtotal, Contractor \$170,000  Engineer \$25,000 Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall \$190,000  Post-Construction Submittals/As-Builts \$43,000  Subtotal, Construction Activities \$990,000 Scope Contingency (15% of Construction Activities Subtotal) \$150,000 Bid Contingency (15% of Construction Activities Subtotal) \$150,000  Subtotal, Construction Activities with Contingencies \$1,300,000  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies) \$78,000 Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000 Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000		\$9,243
Subtotal, Contractor \$170,000  Engineer \$25,000  Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall \$190,000  Post-Construction Submittals/As-Builts \$43,000  Subtotal, Construction Activities \$990,000  Scope Contingency (15% of Construction Activities Subtotal) \$150,000  Bid Contingency (15% of Construction Activities Subtotal) \$150,000  Subtotal, Construction Activities with Contingencies \$1,300,000  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies) \$78,000  Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000  Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Transportation/Disposal	\$37,000
Engineer \$25,000 Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall \$190,000  Post-Construction Submittals/As-Builts \$43,000  Subtotal, Construction Activities \$990,000 Scope Contingency (15% of Construction Activities Subtotal) \$150,000 Bid Contingency (15% of Construction Activities Subtotal) \$150,000  Subtotal, Construction Activities with Contingencies \$1,300,000  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies) \$78,000 Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000 Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Site Restoration	\$79
Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall  Post-Construction Submittals/As-Builts  \$43,000  Subtotal, Construction Activities \$5990,000 Scope Contingency (15% of Construction Activities Subtotal) \$150,000  Bid Contingency (15% of Construction Activities Subtotal) \$150,000  Subtotal, Construction Activities with Contingencies  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies) Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000 Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Subtotal, Contractor	\$170,000
Post-Construction Submittals/As-Builts \$43,000  Subtotal, Construction Activities \$990,000 Scope Contingency (15% of Construction Activities Subtotal) \$150,000 Bid Contingency (15% of Construction Activities Subtotal) \$150,000  Subtotal, Construction Activities with Contingencies \$1,300,000  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies) \$78,000 Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000 Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Engineer	\$25,000
Subtotal, Construction Activities Scope Contingency (15% of Construction Activities Subtotal) Sid Contingency (15% of Construction Activities Subtotal) Subtotal, Construction Activities with Contingencies  Professional/Technical Services Project Management (6% of Construction Activities Subtotal w/Contingencies) Remedial Design (12% of Construction Activities Subtotal w/Contingencies) Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall	\$190,000
Scope Contingency (15% of Construction Activities Subtotal)  Bid Contingency (15% of Construction Activities Subtotal)  Subtotal, Construction Activities with Contingencies  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies)  Remedial Design (12% of Construction Activities Subtotal w/Contingencies)  Construction Management (8% of Construction Activities Subtotal w/Contingencies)  \$150,000	Post-Construction Submittals/As-Builts	\$43,000
Bid Contingency (15% of Construction Activities Subtotal)  Subtotal, Construction Activities with Contingencies  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies)  Remedial Design (12% of Construction Activities Subtotal w/Contingencies)  Construction Management (8% of Construction Activities Subtotal w/Contingencies)  \$150,000	Subtotal, Construction Activities	\$990,000
Subtotal, Construction Activities with Contingencies \$1,300,000  Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies) \$78,000 Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000 Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Scope Contingency (15% of Construction Activities Subtotal)	\$150,000
Professional/Technical Services  Project Management (6% of Construction Activities Subtotal w/Contingencies) \$78,000 Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000 Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Bid Contingency (15% of Construction Activities Subtotal)	\$150,000
Project Management (6% of Construction Activities Subtotal w/Contingencies) \$78,000 Remedial Design (12% of Construction Activities Subtotal w/Contingencies) \$160,000 Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Subtotal, Construction Activities with Contingencies	\$1,300,000
Remedial Design (12% of Construction Activities Subtotal w/Contingencies)\$160,000Construction Management (8% of Construction Activities Subtotal w/Contingencies)\$100,000	Professional/Technical Services	
Construction Management (8% of Construction Activities Subtotal w/Contingencies) \$100,000	Project Management (6% of Construction Activities Subtotal w/Contingencies)	\$78,000
		\$160,000
Subtotal, Professional/Technical Services \$340,000	Construction Management (8% of Construction Activities Subtotal w/Contingencies)	\$100,000
	Subtotal, Professional/Technical Services	\$340,000

#### **Cost Estimate Summary for**

## Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater Feasibility Study

Institutional Controls	
Establish Deed Restrictions	\$50,000
Subtotal, Institutional Controls	\$50,000
TOTAL, CAPITAL COSTS	\$1,700,000
ANNUAL O&M COSTS	
O&M Activities	
Groundwater Treatment System O&M	
Contractor	\$89,000
Utilities	\$5,000
Engineer	\$16,000
Laboratory	\$21,000
Subtotal, Groundwater Treatment System O&M	\$130,000
Annual Maintenance/Repair Activities	
Contractor	\$3,000
Engineer	\$1,100
Subtotal, Annual Maintenance/Repair Activities	\$4,200
Groundwater and Surface Water Monitoring Engineer	
Preparation/Mobilization/Demobilization	\$8,600
Water Level Gauging Event	\$3,900
Sampling Event	\$46,000
Investigation-Derived Waste Disposal	\$2,000
Subtotal, Engineer	\$60,000
Laboratory	\$13,000
Contractor	\$9,600
Subtotal, Groundwater and Surface Water Monitoring	\$83,000
Subtotal, Annual O&M Activities Costs	\$220,000
Scope Contingency (15% Annual O&M Activities Subtotal)	\$33,000
Bid Contingency (15% Annual O&M Activities Subtotal)	\$33,000
Subtotal, O&M Activities with Contingencies	\$290,000
Professional/Technical Services	
Project Management (10% Annual O&M Activities Subtotal w/Contingencies)	\$29,000
Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)	\$44,000
Subtotal, Professional/Technical Services	\$73,000
TOTAL AND A CONTROL OF THE CONTROL O	12.00.00
TOTAL, ANNUAL O&M COSTS	\$360,000

#### **Cost Estimate Summary for**

## Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### PERIODIC COSTS

Every 5 Years O&M Activities	
Periodic Maintenance/Repair Activities (every 5 years)	
Contractor	
Monitoring Well Decommisioning & Replacement	\$9,800
Update Elevation Survey	\$2,800
Subtotal, Contractor	\$13,000
Engineer	\$9,900
Subtotal, Periodic Maintenance/Repair Activities (every 5 years)	\$22,000
Subtotal, Every 5 Year O&M Activities	\$22,000
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)	\$3,300
Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)	\$3,300
Subtotal, Every 5 Year O&M Activities with Contingencies	\$29,000
Year 100 Construction/O&M Activities	
Decomissioning of Monitoring Network (year 100 only)	
Contractor	\$82,000
Engineer	\$68,000
Subtotal, Decomissioning of Monitoring Network (year 100 only)	\$150,000
Decomissioning of Groundwater Treatment System (year 100 only)	
Contractor	
Decomission Treatment System Equipment & Building	\$65,000
Decomission Utilities	\$48,000
Decomission Extraction Trench, Piping & Discharge Outfall	\$34,000
Subtotal, Contractor	\$150,000
Engineer	\$32,000
Subtotal, Decomissioning of Groundwater Treatment System (year 100 only)	\$180,000
Subtotal, Year 100 Construction/O&M Activities	\$330,000
Scope Contingency (15% of Year 100 O&M Activities Subtotal)	\$50,000
Bid Contingency (15% of Year 100 O&M Activities Subtotal)	\$50,000
Subtotal, Year 100 Construction/O&M Activities with Contingencies	\$430,000
Subtotal, Periodic Construction/O&M Costs	\$460,000
Professional/Technical Services	
Project Management (10% of Periodic O&M Activities Subtotal w/Contingencies)	\$46,000
Technical Support (15% of Periodic O&M Activities Subtotal w/Contingencies)	\$69,000
Five-Year Review	\$13,000
Subtotal, Professional/Technical Services	\$130,000
TOTAL, PERIODIC COSTS	\$590,000

#### **Cost Estimate Summary for**

## Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	Total Cost	Total Cost Per Year	Discount Factor	<u>Present Value</u>
Capital Costs	0	\$1,700,000	\$1,700,000	1	\$1,700,000
Annual O&M Costs	1-100	\$36,000,000	\$360,000	14.3	\$5,140,000
Periodic Costs	5	\$49,000	\$49,000	0.713	\$35,000
Periodic Costs	10	\$49,000	\$49,000	0.508	\$25,000
Periodic Costs	15	\$49,000	\$49,000	0.362	\$17,700
Periodic Costs	20	\$49,000	\$49,000	0.258	\$12,600
Periodic Costs	25	\$49,000	\$49,000	0.184	\$9,000
Periodic Costs	30	\$49,000	\$49,000	0.131	\$6,400
Periodic Costs	35	\$49,000	\$49,000	0.0937	\$4,600
Periodic Costs	40	\$49,000	\$49,000	0.0668	\$3,300
Periodic Costs	45	\$49,000	\$49,000	0.0476	\$2,300
Periodic Costs	50	\$49,000	\$49,000	0.0339	\$1,660
Periodic Costs	55	\$49,000	\$49,000	0.0242	\$1,190
Periodic Costs	60	\$49,000	\$49,000	0.0173	\$850
Periodic Costs	65	\$49,000	\$49,000	0.0123	\$600
Periodic Costs	70	\$49,000	\$49,000	0.00877	\$430
Periodic Costs	75	\$49,000	\$49,000	0.00625	\$310
Periodic Costs	80	\$49,000	\$49,000	0.00446	\$220
Periodic Costs	85	\$49,000	\$49,000	0.00318	\$156
Periodic Costs	90	\$49,000	\$49,000	0.00227	\$111
Periodic Costs	95	\$49,000	\$49,000	0.00162	\$79
Periodic Costs	100	\$590,000	\$590,000	0.00115	\$679

#### TOTAL PRESENT VALUE OF ALTERNATIVE

\$7,000,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

Detailed Cost Estimate for

#### ${\bf Alternative~SW-3:~Groundwater~Collection~with~Ex-Situ~Treatment~of~Groundwater}$

#### Feasibility Study

Revision No.: 01 - DRAFT

Date: October 2007

DESCRIPTION CAPITAL COSTS	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Construction Activities Implementation Plans/Submittals	1	\$86,000	Ea.	\$86,000	SHA estimate
Installation of Groundwater Treatment System					
Contractor Treatment System Equipment Installation Equipment Installation					
Equalization/settling tank	1	\$3,530	Ea.	\$3,530	Harrington Industrial Plastics, LLC, 2005; Assumes 3,000 gal. XLPE vertical storage tank.
Equalization tank water pump	1	\$2,558	Ea.	\$2,558	ECHOS 33 29 0117; 15 GPM, 1/2 HP, Transfer Pump with Motor, Valves, Piping
Hurricane Cartridge Filters	2	\$3,000	Ea.	\$6,000	SHA estimate, based on experience.
pH Adjustment					
HCl storage tank	1	\$2,657	Ea.	\$2,657	Harrington Industrial Plastics, LLC, 2005; Assumes 2,500 gal. XLPE vertical storage tank
HCl feed pump	1	\$906	Ea.	\$906	Harrington Industrial Plastics, LLC, 2005; Assumes PULSAtron® Electric Metering Pump; 44 gpd
Secondary containment for chemical storage	1	\$2,565	L.S.	\$2,565	SHA estimate; Assume approximately \$2/gal.
Static mixer for inline pH adjustment	1	\$125	Ea.	\$125	Harrington Industrial Plastics, LLC, 2005; Assumes Komac CPS 1-inch PVC Static Mixer
Primary Metals Treatment					
GreenSand filtration system & media, continuous	1	\$12,600	L.S.	\$12,600	SHA discussions with Siemens Corporation.
backwash configuration KMnO4 storage tank	1	\$144	Ea.	\$144	Harrington Industrial Plastics, LLC, 2005; Assumes 65
KMnO4 feed pump	1	\$808	Ea.	\$808	gal. HDLPE vertical storage tank Harrington Industrial Plastics, LLC, 2005; Assumes PULSAtron® Electric Metering Pump; 12 gpd
VOC Treatment					
Carbon adsorption system; 2 PV 200 fiberglass adsorbers, 400 lbs virgin AC830AW acid washed water treatment carbon	1	\$3,500	L.S.	\$3,500	SHA discussions with Siemens Corporation.
Secondary Metals Treatment					
Secondary Metals Treatment  Ion Exchange System, (4) 3.5 C.F. vessels, Resin types include: CSO, SCC, ASG	1	\$5,120	L.S.	\$5,120	SHA discussions with Siemens Corporation.
Backwash Operations					
Backwash Receiving Tank	1	\$436	Ea.	\$436	Harrington Industrial Plastics, LLC, 2005; Assumes 300 gal. HDLPE vertical storage tank.
Backwash receiving tank water pump	1	\$2,558	Ea.	\$2,558	ECHOS 33 29 0117; Assumes 15 GPM, 1/2 HP, Transfer Pump with Motor, Valves, Piping.
Hurricane Cartridge Filters	2	\$3,000	Ea.	\$6,000	SHA estimate, based on experience.
Miscellaneous					
Air compressor for system air supply	1	\$15,516	Ea.	\$15,516	ECHOS 33 31 0204; Assumes 15 HP, 120 Gallon, 200 PSI, 50 SCFM, Air Compressor.
Equipment delivery, setup, and installation of interconnecting piping and misc. components	1	\$148,235	L.S.	\$148,235	SHA estimate; Assumes 50% of treatment system equipment costs
Subtotal, Treatment	System E	quipment I	nstallation	\$210,000	\$213,258

**Detailed Cost Estimate for** 

#### ${\bf Alternative~SW-3:~Groundwater~Collection~with~Ex-Situ~Treatment~of~Groundwater}$

#### Feasibility Study

Revision No.: 01 - DRAFT

Date: October 2007

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

	•	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
	Instrumentation			T T		Tanana and a same and
	Extraction trench sump instrumentation	1	\$4,000	L.S.	\$4,000	SHA estimate; Includes pressure gauge, level transducer, flow meter.
	Equalization tank level transducer	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out 20 mA output signal
	pH probe/controller	2	\$6,784	Ea.	\$13,568	ECHOS 33 02 1512 through 33 02 1523
	NaOH tank level transducer	1	\$4,750			SHA estimate; Side-mounted, continuous read-out
	Vigin 1.1		<b></b>	-	0.4.7.50	20 mA output signal
	HCl tank level transducer	1	\$4,750			SHA estimate; Side-mounted, continuous read-out 20 mA output signal
	Backwash receiving tank level transducer	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out 20 mA output signal
	KMnO4 tank level transducer	1	\$4,750	Ea.	\$4,750	SHA estimate; Side-mounted, continuous read-out 20 mA output signal
	Differential pressure transducers across	2	\$1,760	Ea.	\$3,520	ECHOS 13273 4164
	filtration/adsorption/exchange systems					
	Misc. high level alarm switches	3	\$692	Ea.	\$2,076	ECHOS 33 23 1306
	Pressure gauges	10	\$224			ECHOS 33 31 0209
	Effluent flow meter	1	\$4,750			SHA estimate; Side-mounted, continuous read-out
						20 mA output signal
		Subt	otal, Instru	mentation =	\$54,000	\$53,904
			,		72 1,000	+,
	Electrical					
	Service entry to treatment building	1	\$10,000	L.S.	\$10,000	SHA estimate, based on experience.
	Treatment system equipment/instruments	1	\$100,000			SHA estimate, based on experience.
	Control panel	1	\$50,000			SHA estimate, based on experience.
	Exterior conduit/cable to extraction trench	1	\$10,000			SHA estimate, based on experience.
	Lighting	1	\$5,000			SHA estimate, based on experience.
	Lighting	1		Electrical	\$180,000	<u> </u>
	Excavating Trench, common earth, 4' to 6' deep, 1-				\$060	Moone 21 22 16 12 1260: Accumage transh of
	1/2 C.Y. excavator with trench box	149	\$1	C.Y.	\$969	
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y.	149		C.Y.		· ·
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate,		\$2		\$349	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	149 149	\$2	C.Y.	\$349 \$1,241	approximately 400' long by 2' wide by 5' deep; Ass H&S level C. Means 31 23 16.13 3080; Assumes H&S level D. ECHOS 17 03 0511; Assumes H&S level D.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80	149 149 400	\$2 \$8 \$18	C.Y. C.Y.	\$349 \$1,241 \$7,200	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"	149 149	\$2	C.Y. C.Y.	\$349 \$1,241 \$7,200	approximately 400' long by 2' wide by 5' deep; Ass H&S level C. Means 31 23 16.13 3080; Assumes H&S level D. ECHOS 17 03 0511; Assumes H&S level D.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP)	149 149 400	\$2 \$8 \$18	C.Y.  L.F. Ea.	\$349 \$1,241 \$7,200 \$443	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"	149 149 400 1	\$2 \$8 \$18 \$443	C.Y. C.Y. L.F. Ea.	\$349 \$1,241 \$7,200 \$443	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation	149 149 400 1	\$2 \$8 \$18 \$443 \$73 \$96 \$99	C.Y.  C.Y.  L.F. Ea.  Ea. Hr.	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"	149 149 400 1	\$2 \$8 \$18 \$443 \$73 \$96	C.Y.  C.Y.  L.F. Ea.  Ea. Hr.	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation	149 149 400 1 1 1 1 8	\$2 \$8 \$18 \$443 \$73 \$96 \$99	C.Y.  L.F. Ea.  Ea. Hr. Ea.	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee	149 149 400 1 1 1 1 8	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103	C.Y.  L.F. Ea.  Ea. Hr. Ea.	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA SHA estimate, based on experience.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation	149 149 400 1 1 1 1 8	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103	C.Y.  C.Y.  L.F. Ea.  Ea. Hr. Ea. ter Supply	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee  Treatment Building  12" Structural Slab on Grade  Pre-Engineered Steel Buildings, 35' long by 30'	149 149 400 1 1 1 8 1 So	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103 <b>ubtotal, Wa</b>	C.Y.  L.F. Ea.  Ea. Hr. Ea. ter Supply	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee  Treatment Building  12" Structural Slab on Grade  Pre-Engineered Steel Buildings, 35' long by 30' wide by 16' high (eave height)	149 149 400 1 1 1 St	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103 <b>ubtotal, Wa</b> \$30,000	C.Y.  C.Y.  L.F. Ea.  Ea. Hr. Ea. ter Supply	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000 \$30,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265  SHA estimate, based on experience; Assumes 1,050 S.F.  SHA estimate, based on experience.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee  Treatment Building  12" Structural Slab on Grade  Pre-Engineered Steel Buildings, 35' long by 30'	149 149 400 1 1 1 1 St	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103 <b>ubtotal, Wa</b> \$30,000 \$70,000	C.Y.  C.Y.  L.F. Ea.  Ea. Hr. Ea. ter Supply  L.S.  L.S.	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000 \$70,000 \$15,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265  SHA estimate, based on experience.  SHA estimate, based on experience.
	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee  Treatment Building  12" Structural Slab on Grade  Pre-Engineered Steel Buildings, 35' long by 30' wide by 16' high (eave height)	149 149 400 1 1 1 1 St	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103 <b>ubtotal, Wa</b> \$30,000 \$70,000 \$15,000 <b>l, Treatmen</b>	C.Y.  C.Y.  L.F. Ea.  Ea. Hr. Ea. ter Supply  L.S.  L.S.	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000 \$30,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265  SHA estimate, based on experience; Assumes 1,050 S.F.  SHA estimate, based on experience.
Enci	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee  Treatment Building  12" Structural Slab on Grade  Pre-Engineered Steel Buildings, 35' long by 30' wide by 16' high (eave height)  Heating system	149 149 400 1 1 1 1 St	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103 <b>ubtotal, Wa</b> \$30,000 \$70,000 \$15,000 <b>l, Treatmen</b>	C.Y.  C.Y.  L.F. Ea.  Ea. Hr. Ea. ter Supply  L.S.  L.S.  L.S.  tt Building	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000 \$70,000 \$15,000 \$120,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265  SHA estimate, based on experience.  SHA estimate, based on experience.
Engio	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee  Treatment Building  12" Structural Slab on Grade  Pre-Engineered Steel Buildings, 35' long by 30' wide by 16' high (eave height)  Heating system	149 149 400 1 1 1 8 1 1 Subtota	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103 <b>ubtotal, Wa</b> \$30,000 \$70,000 \$15,000 <b>l, Treatmen</b> <b>Subtotal, O</b>	C.Y.  C.Y.  L.F. Ea. Ea. Hr. Ea. ter Supply  L.S.  L.S.  L.S.  t Building Contractor	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000 \$70,000 \$15,000 \$120,000 \$570,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265  SHA estimate, based on experience.  SHA estimate, based on experience.  SHA estimate, based on experience.
Engia	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee  Treatment Building  12" Structural Slab on Grade  Pre-Engineered Steel Buildings, 35' long by 30' wide by 16' high (eave height)  Heating system	149 149 400 1 1 1 1 8 1 1 Subtota	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103 <b>abtotal, Wa</b> \$30,000 \$70,000 \$15,000 <b>l, Treatmer</b> <b>Subtotal, G</b>	C.Y.  C.Y.  L.F. Ea. Ea. Hr. Ea. ter Supply  L.S. L.S. L.S. t Building Contractor	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000 \$70,000 \$120,000 \$120,000 \$570,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265  SHA estimate, based on experience.  SHA estimate, based on experience.
Engin	1/2 C.Y. excavator with trench box  Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift  Black seemless steel pipe, 2", Schedule 80  High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"  Underground Utility Enclosure  Freeze-Protection Strip Heater, 12"  BFP and Enclosure Installation  Utilities Hook-up Fee  Treatment Building  12" Structural Slab on Grade  Pre-Engineered Steel Buildings, 35' long by 30' wide by 16' high (eave height)  Heating system	149 149 400 1 1 1 8 1 1 Subtota	\$2 \$8 \$18 \$443 \$73 \$96 \$99 \$5,103 <b>ubtotal, Wa</b> \$30,000 \$70,000 \$15,000 <b>l, Treatmen</b> <b>Subtotal, O</b>	C.Y.  C.Y.  L.F. Ea. Ea. Hr. Ea. ter Supply  L.S. L.S. L.S. t Building Contractor	\$349 \$1,241 \$7,200 \$443 \$73 \$96 \$792 \$5,103 \$16,000 \$70,000 \$120,000 \$120,000 \$570,000	approximately 400' long by 2' wide by 5' deep; Ass H&S level C.  Means 31 23 16.13 3080; Assumes H&S level D.  ECHOS 17 03 0511; Assumes H&S level D.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  McMaster-Carr, 2007.  ECHOS Crew Code MPLUA  SHA estimate, based on experience.  \$16,265  SHA estimate, based on experience.  SHA estimate, based on experience.  SHA estimate, based on experience.

\$670,000

\$673,615

Subtotal, Installation of Groundwater Treatment System

Detailed Cost Estimate for

Revision No.: 01 - DRAFT

Date: October 2007

#### ${\bf Alternative~SW-3:~Groundwater~Collection~with~Ex-Situ~Treatment~of~Groundwater}$

#### Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

UNIT

DESCRIPTION QTY COSTS UNITS COST COMMENTS/REFERENCE Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall

ractor					
Mobilization/Demobilization	-	0.445	-	4024	24 74 26 70 0020 4 70 11
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	\$305	Ea.	\$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Medium Equipment	4	\$399			ECHOS 33 17 0802; Includes frac tank & water
^ ^					Assumes H&S level D.
Subtotal	l, Mobili	zation/Dem	obilization	\$4,300	\$4,266
Extraction Trench Excavation & Dewatering					
Strip Soil Cap & Stockpile Material, 1-1/2 C.Y.	44	\$12	C.Y.	\$533	ECHOS 17 03 0276; Assumes H&S level C.
excavator, Medium Material					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic	50	\$299	Hr.	\$14,950	ECHOS 17 03 0231; Assumes trench of 200' long
Excavator					wide by 15' deep; Assumes H&S level C.
	5	\$448	Ea.	\$2,240	ECHOS 02228 3120; Assumes trench of 200' lon
Trench Box, Daily Rental					wide by 15' deep; Assumes H&S level C.
Water Truck	50	\$146	Hr	\$7 300	ECHOS Crew Code COKBM (Modified); Assun
water fluck	30	φ140	111.	φ1,300	H&S level C.
Sprayed Water Dust Suppressant	600	\$0.06	SF	\$36	ECHOS 33 08 0585; Assumes H&S level C.
Vacuum Truck	50	\$113.00			ECHOS 33 19 0111; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	1		Month		Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	1	\$375	Month	\$375	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	1		Month		Rain for Rent, Inc. Quote dated 09/24/07
pH Adjustment Chemicals	55	\$3		· · · · · · · · · · · · · · · · · · ·	SHA discussions with Harcros Chemicals, Inc.; U
r				7-00	cost includes 20% mark-up for drum delivery; Se supporting calculations.
Filtration system, 4-stage tandem unit, 200 gpm	1	\$2,800	Month	\$2,800	SHA discussions with N.E. Environmental Soluting.
Filtration system hoses	1	\$400	Month	\$400	SHA discussions with N.E. Environmental Solut Inc.
Filtration system pumps, 2" submersibles	1	\$800	Month	\$800	SHA discussions with N.E. Environmental Solutinc.
Filters	40	\$8	Ea.	\$320	SHA discussions with N.E. Environmental Soluting.
Subtotal, Extraction Tre	nch Exca	avation & D	ewatering =	\$36,000	\$36,082
Extraction Trench Construction & Backfill					
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y.	333	\$2.34	C.Y.	\$780	Means 31 23 16.13 3080; Assumes trench of 200
bucket, 100' haul		Ψ2.5	0.1.	Ψ,00	by 3' width by 15' deep; Assumes H&S level D.
Pea Gravel	222	\$64	C.Y.	\$14,222	ECHOS 33 06 1042
Unclassified Fill, Delivered, Off-site	67		C.Y.	\$800	ECHOS 02223 1001
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	131	\$8.33	C.Y.	\$1,092	ECHOS 17 03 0511; Assumes H&S level D.
8" Diameter Perforated PVC Pipe	200	\$16	L.F.	\$3,200	ECHOS 33 26 0903
Precast, CIP Base, 4' Diameter, 15' Deep, Manhole	1	\$4,936			ECHOS 19 02 0203
Submersible Stainless Steel Effluent Pump	1	\$3,000	Ea.	\$3,000	SHA estimate, based on experience.
24" Well Finish, Cover, Flush w/Grade, Manhole,	1	\$479			ECHOS 33 23 2224
Lock Cap					
80 Mil Polymeric Liner, High-density Polyethylene	2,400	\$6	S.F.	\$14,400	ECHOS 33 08 0573
8 oz/sy Erosion Control/Drainage Filter Fabric (80 Mil)	580	\$2	S.Y	\$1,433	ECHOS 33 08 0532
Extraction Trench Development	1	\$1,000	LS	\$1,000	SHA estimate, based on experience.
Subtotal Extraction T			P. Pool:fill	\$1,000	\$45,242
	. ~			d 4 = 000	

\$45,000

\$45,342

Subtotal, Extraction Trench Construction & Backfill

Detailed Cost Estimate for

 ${\bf Alternative~SW-3:~Groundwater~Collection~with~Ex-Situ~Treatment~of~Groundwater}$ 

#### Feasibility Study

Revision No.: 01 - DRAFT

Date: October 2007

	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Underground Piping Excavation Strip Soil Cap & Stockpile Material 1-1/2 C Y	56	\$12.00	CV	\$676	ECHOS 17 03 0276; Assumes H&S level C.
excavator, Medium Material	30	Ψ12.00	C. 1 .	Ψ070	Derios 17 03 0270, Assumes fixes level C.
Crawler-mounted, 1.25 C.Y. 225 Hydraulic	50	\$299.00	Hr.	\$14,950	ECHOS 17 03 0231; Assumes approximately 380 fe
Excavator					of trench approximately 3' wide by 5' deep; Assumes H&S level C.
Trench Box, Daily Rental	5	\$448	Ea.	\$2,240	ECHOS 02228 3120; Assumes approximately 380 fc of trench approximately 3' wide by 5' deep; Assumes H&S level C.
Water Truck	24	\$146.00	Hr.	\$3,504	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	760	\$0.06	S.F.	\$46	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, U	ndergrou	nd Piping I	Excavation	\$21,000	\$21,415
I I I I I I I I I I I I I I I I I I I					
2 2	1/11	\$2.34	CV	\$320	Means 31 23 16.13 3080; Assumes trench of 200' lor
bucket, 100' haul	141	\$2.54	C.1.	\$327	by 3' width by 15' deep; Assumes H&S level D.
Compact Backfill, by Hand with Vibrating Plate,	140.74	\$8.33	C.Y.	\$1,172	ECHOS 17 03 0511; Assumes H&S level D.
1" PVC, Schedule 40, Connection Piping	380	\$4.29	L.F.	\$1,630	ECHOS 33 26 0410
	d Piping	Placement	& Backfill		
Surface Water Discharge Outfall	2.1	0017		05.150	T-C1100 47 02 0204 4 4 40 0 4 1 D
-	24	\$215	Hr.	\$5,160	ECHOS 17 03 0231; Assumes H&S level D.
	24	\$144	Иr	\$3.456	ECHOS 17 03 0222; Assumes H&S level D.
·					ECHOS 17 03 0222, Assumes 1823 level D. ECHOS 18 05 0202
Rock Cover, Riprap, Eight (10 to 100 Eb 1 icccs)	10	ψ50	C. 1 .	Ψ500	Dell'05 10 05 0202
Pea Gravel	15	\$64.00	C.Y.	\$960	ECHOS 33 06 1042
8 oz/sy Erosion Control/Drainage Filter Fabric (80 Mil)	30	\$2	S.Y	\$74	ECHOS 33 08 0532
Cast-in-place concrete curb, wood forms, 6" x 18", straight	20	\$11	L.F.	\$220	Means 32 16 13.13 0300
Subtotal, Su	rface Wa	ter Dischar	ge Outfall	\$10,000	\$10,370
Soil Stabilization					
Cement Stabilization, 6%	288.89	\$32	B.C.Y.	\$9,243	ECHOS 17 03 0602; Assumes 100% of excavated material, excluding cover material/topsoil, require stabilization; Assumes H&S level D.
	Subt	otal, Soil St	abilization	\$9,243	
The second of the China and					
	433	\$80	Ton	\$34 667	SHA discussions with Waste Management, Inc.
Water, Non-Hazardous	10,000				SHA discussions with N.E. Environmental Solutions
Sul	ntotal Tr	ansnortatio	n/Disnosal	\$37,000	\$36,667
	ototui, 11	шырог шио	п/Візрозиі	ψ37,000	ψ20,007
Site Restoration					
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	3	\$26	M.S.F.	\$79	Means 32 92 19.13 0800
	Sub				\$79
		Subtotal, (	Contractor	\$170,000	\$166,596
eer Labor, Oversight	220	002	Hr.	\$21,780	Assumes 1 month of field work; See Note 3.
			L.S.		Assume 15% of labor cost
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	\$3,207	E.S.	72,22	
	Strip Soil Cap & Stockpile Material, 1-1/2 C.Y. excavator, Medium Material Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator  Trench Box, Daily Rental  Water Truck  Sprayed Water Dust Suppressant  Subtotal, U  Underground Piping Placement & Backfill Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift 1" PVC, Schedule 40, Connection Piping  Subtotal, Undergroun  Surface Water Discharge Outfall  Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator 926, 2.0 CY, Wheel Loader Rock Cover, Riprap, Light (10 to 100 Lb Pieces)  Pea Gravel 8 oz/sy Erosion Control/Drainage Filter Fabric (80 Mil)  Cast-in-place concrete curb, wood forms, 6" x 18", straight  Subtotal, Su  Soil Stabilization  Cement Stabilization  Cement Stabilization, 6%  Transportation/Disposal Asbestos-Impacted Soils, Non-Hazardous Water, Non-Hazardous  Sut  Site Restoration Mechanical Seeding, Grass seed hand push	Strip Soil Cap & Stockpile Material, 1-1/2 C.Y. excavator, Medium Material Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator  Trench Box, Daily Rental  Sprayed Water Dust Suppressant  Tobucket, 100' haul  Compact Backfill, by Hand with Vibrating Plate, 140.74  (15 cm) Lift Tench Box, Connection Piping Subtotal, Underground Piping Subtotal, Underground Piping Subtotal, Underground Piping  Subtotal, Underground Piping  Subtotal, Underground Piping  Subtotal, Underground Piping  Subtotal, Underground Piping  Subtotal, Underground Piping  Subtotal, Underground Piping  Surface Water Discharge Outfall  Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator  926, 2.0 CY, Wheel Loader Rock Cover, Riprap, Light (10 to 100 Lb Pieces)  10  Pea Gravel  8 oz/sy Erosion Control/Drainage Filter Fabric (80 Mil)  Cast-in-place concrete curb, wood forms, 6" x 18", 20  straight  Subtotal, Surface Wa  Soil Stabilization  Cement Stabilization  Cement Stabilization, 6%  Subtotal, Transportation/Disposal  Asbestos-Impacted Soils, Non-Hazardous  433  Water, Non-Hazardous  10,000  Subtotal, Transportation/Disposal  Asbestos-Impacted Soils, Non-Hazardous  Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	Strip Soil Cap & Stockpile Material, 1-1/2 C.Y.   56   \$12.00	Strip Soil Cap & Stockpile Material, 1-1/2 C.Y.   56   \$12.00   C.Y.	Strip Soil Cap & Stockpile Material, 1-1/2 C.Y.   56   \$12.00   C.Y.   \$676   \$cxcavaror, Medium Material   \$14,950   \$14,95

Detailed Cost Estimate for

#### Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater

#### Feasibility Study

Revision No.: 01 - DRAFT

Date: October 2007

DESCRIPTION Post-Construction Submittals/As-Builts	<b>QTY</b>	UNIT COSTS \$43,000	UNITS Ea.	COST \$43,000	COMMENTS/REFERENCE SHA estimate
Si	ıbtotal, C	Construction	Activities	\$990,000	
Scope Contingency (15% of Construction Activities Subtotal)					OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% of Construction Activities Subtotal)				\$150,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction	n Activiti	es with Con	tingencies	\$1,300,000	
Professional/Technical Services					
Project Management (6% of Construction Activities Subtotal w/Contingencies)				\$78,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Remedial Design (12% of Construction Activities Subtotal w/Contingencies)				\$160,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
Construction Management (8% of Construction Activities Subtotal w/Contingencies)				\$100,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Subtotal, I	Profession	nal/Technic	al Services	\$340,000	
Institutional Controls Establish Deed Restrictions  Engineer					
Establish Institutional Controls in the form of Deed Restrictions	10	\$5,000	Ea.	\$50,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
		Subtotal	, Engineer	\$50,000	\$50,000
Subto	tal, Estab	olish Deed R	estrictions	\$50,000	\$50,000
•	Subtotal,	Institutiona	al Controls	\$50,000	
	TOTA	AL, CAPITA	AL COSTS	\$1,700,000	
ANNUAL O&M COSTS O&M Activities Groundwater Treatment System O&M					
Contractor					

Conti	ractor
	_

Ion exchange resin changeouts	1	\$8,620	L.S.	\$8,620	SHA discussions with Siemens Corporation; Seimens
					estimated 2.5 changeouts per year.
Liquid-phase carbon changeouts	18	\$900	Ea.	\$16,200	SHA discussions with Siemens Corporation; Seimens estimated 18 changeouts per year.
pH adjustment chemicals	14000	\$2	Gal.	\$28,000	SHA discussions with Harcros Chemicals, Inc.; Unit cost assumes bulk delivery; See supporting calculations.
GreenSand regeneration chemicals	1	\$534	Ea.	\$534	SHA discussions with Harcros Chemicals, Inc.; Unit costs assume 55-gallon drums; See supporting calculations.
Filter cartridge disposal	104	\$180	Ea.	\$18,720	N.E. Environmental Solutions, Inc. 2006 Fee Schedule Assumes 2 drums per week required for disposal of cartridges.
Extraction trench sump maintenance	1	\$1,500	L.S.	\$1,500	SHA estimate, based on experience.
Equipment maintenance	1	\$15,000	L.S.	\$15,000	SHA estimate, based on experience.
		Subtotal, C	Contractor	\$89,000	\$88,574
ilities					
Electricity	1	\$5,000	L.S.	\$5,000	SHA estimate; See supporting calculations.
		Subtota	al, Utilities	\$5,000	\$5,000

Detailed Cost Estimate for

Revision No.: 01 - DRAFT

Date: October 2007

#### ${\bf Alternative~SW\text{-}3:~Groundwater~Collection~with~Ex\text{-}Situ~Treatment~of~Groundwater}$

#### Feasibility Study

TION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor, Operator	121	\$990	L.S.	\$119,790	SHA estimate; Assumes approximately 2 visits per week, with additional time for unscheduled visits; See Note 3.
Labor, Monthly Reporting	12	\$1,584	Ea.	\$19,008	Unit cost assumes 16 labor hours at an average rate of \$124/hr; See Note 3.
Labor, Annual Summary Report Preparation	115	\$124	Hr.		See Note 3.
Misc. Office Expenses (e.g., reproduction,	1	\$1,663	L.S.	\$1,663	Assume 5% of office support labor cost.
supplies, telephone/fax, postage, etc.)		Subtotal	, Engineer	\$16,000	\$15,923
I al anatam					
Chemical analysis, VOCs by 8260B	26	\$185	Fa	\$4,810	2006-2007 Fee Schedule, Alpha Woods Hole Labs;
Chemical analysis, vocs by 8200b	20	\$103	Ed.	94,010	Assumes 2 monthly influent/effluents samples & 2 so annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, SVOCs by 8270c	26	\$360	Ea.	\$9,360	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 se annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, Metals by 200.7	26	\$240	Ea.	\$6,240	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 seannual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, pH	26	\$13	Ea.	\$338	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 so annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, PCBs by 608	2	\$145	Ea.	\$290	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmator samples, consistent with RGP.
Chemical analysis, TPH by 1664	2	\$150	Ea.	\$300	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmator samples, consistent with RGP.
Chemical analysis, TSS by 160.2	2	\$2	Ea.	\$4	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmato samples, consistent with RGP.
Chemical analysis, Total Cyanide by 4500CN	2	\$41	Ea.	\$82	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmator samples, consistent with RGP.
Chemical analysis, Total Residual Chlorine by 330.1	2	\$26	Ea.	\$52	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmato samples, consistent with RGP.
		Subtotal, I	aboratory	\$21,000	\$20,748
Subtotal, Ground	lwater Tre	atment Sys	tem O&M	\$130,000	\$130,245
Annual Maintenance/Repair Activities		•			
Contractor					
Clearing, Medium Brush with Average Grub & Some Trees	1	\$1,254	Acre	\$1,254	ECHOS 17 01 0103; Assumes access paths to/from a areas around monitoring points will be cleared at san level of effort as one acre.
Equipment Mobilization	1	\$260	LS	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	1	\$1,275			Environmetal Drilling (EDI) Invoice dated 11/06/03
2" Expansion Plug	2	\$20			Environmetal Drilling (EDI) Invoice dated 11/06/03
80# Concrete Mix	2	\$18			Environmetal Drilling (EDI) Invoice dated 11/06/03
		+-0		+-0	. ,
8" Manhole, water-tight, traffic-rated	2	\$75	Ea.	\$150	Environmetal Drilling (EDI) Invoice dated 11/06/03

Detailed Cost Estimate for

#### ${\bf Alternative~SW-3:~Groundwater~Collection~with~Ex-Situ~Treatment~of~Groundwater}$

#### Feasibility Study

Revision No.: 01 - DRAFT

Date: October 2007

TION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor, Oversight	10	\$99	Ea.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149	L.S.	\$149	Assume 15% of labor cost
,		Subtotal	, Engineer	\$1,100	\$1,139
Subtotal, Ann Groundwater and Surface Water Monitoring	nual Maintena	nce/Repair	Activities	\$4,200	\$4,154
Engineer					
Preparation/Mobilization/Demobilization					
Labor	52	\$99	Hr.	\$5,148	SHA estimate, unit cost based on 2006 Site monitorevent
Truck rental	12	\$70	Day	\$840	Assumes Penskee 16' box truck rental.
Portable Storage Unit Rental	1		Month	\$165	SHA estimate, based on experience.
Portable Eyewash Station	1.5		Week		SHA estimate, based on experience.
55-gallon steel drums	4	\$55	Ea.		N.E. Environmental Solutions, Inc. 2006 Fee Scho
55-gallon poly drums	2	\$60	Ea.	\$120	N.E. Environmental Solutions, Inc. 2006 Fee Sche
Drum delivery	2	\$225	Ea.	\$450	N.E. Environmental Solutions, Inc. 2006 Fee Sche
Dumpster rental	1	\$650	Ea.	\$650	SHA estimate; Assumes 15 CY dumpster rental for weeks and a disposal weight of one ton.
Misc. Expenses (e.g. mileage. telephone,	1	\$773	L.S.	\$773	Assume 15% of labor cost
reproduction, postage, personal protective equipment, etc.)					
Subtotal, Prepar	ration/Mobiliz				40.740
Subtotal, 1 repair	ation/Mobiliz	ation/Dem	obilization	\$8,600	\$8,629
Water Level Gauging Event					
Water Level Gauging Event Labor	34	\$99	Ea.	\$3,366	Based on 2006 Sampling Round Costs.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective			Ea.	\$3,366	
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	34	\$99 \$505	Ea. L.S.	\$3,366	Based on 2006 Sampling Round Costs.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	34	\$99 \$505	Ea. L.S.	\$3,366 \$505	Based on 2006 Sampling Round Costs. Assume 15% of labor cost
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Sul	34	\$99 \$505 <b>Level Gau</b>	Ea. L.S.	\$3,366 \$505 \$3,900	Based on 2006 Sampling Round Costs. Assume 15% of labor cost
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Sul Sampling Event	34 1 btotal, Water	\$99 \$505 <b>Level Gau</b>	Ea. L.S.  cing Event  Location	\$3,366 \$505 \$3,900 \$32,500	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Sul Sampling Event Labor	34 1 btotal, Water	\$99 \$505 Level Gaug \$1,300	Ea. L.S.  ging Event  Location  Wk.	\$3,366 \$505 \$3,900 \$32,500 \$720	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monite event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check balls
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Sui Sampling Event Labor Bladder Pump Bladder Pump Expendables	34 1 btotal, Water 25 4.5 20	\$99 \$505 <b>Level Gau</b> \$1,300 \$160 \$45	Ea. L.S.  cing Event  Location  Wk. Ea.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience.  HAS estimate; Includes teflon bladder, check ball rings and grab plates.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Sui Sampling Event Labor Bladder Pump Bladder Pump Expendables YSI Low Flow Multi Meter	34 1 btotal, Water 25 4.5 20	\$99 \$505 <b>Level Gau</b> ; \$1,300 \$160 \$45	Ea. L.S. ging Event  Location Wk. Ea. Wk.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Sui Sampling Event Labor Bladder Pump Bladder Pump Expendables YSI Low Flow Multi Meter Controller	34 1 btotal, Water 25 4.5 20 4.5 4.5	\$99 \$505 <b>Level Gau</b> ; \$1,300 \$160 \$45 \$325 \$245	Ea. L.S.  ging Event  Location  Wk. Ea.  Wk.  Wk.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103	Based on 2006 Sampling Round Costs. Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sul Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5	\$99 \$505 <b>Level Gau</b> ; \$1,300 \$160 \$45 \$325 \$245 \$85	Ea. L.S.  Location  Wk. Ea.  Wk. Wk.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sul Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor Water Level Meter	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5 4.5	\$99 \$505 <b>Level Gau</b> ; \$1,300 \$160 \$45 \$325 \$245 \$85 \$100	Ea. L.S.  zing Event  Location  Wk. Ea.  Wk. Wk. Wk.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383 \$450	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sul Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor Water Level Meter Turbidity Meter	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5 4.5 4.5	\$99 \$505 <b>Level Gau</b> ; \$1,300 \$160 \$45 \$325 \$245 \$85 \$100 \$90	Ea. L.S.  zing Event  Location  Wk. Ea.  Wk. Wk. Wk. Wk.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383 \$450 \$405	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sul Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor Water Level Meter Turbidity Meter Battery	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5 4.5 4.5 6.5	\$99 \$505 <b>Level Gau</b> <sub>1</sub> \$1,300 \$160 \$45 \$325 \$245 \$85 \$100 \$90 \$25	Ea. Location Wk. Ea. Wk. Wk. Wk. Wk. Wk.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sul Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor Water Level Meter Turbidity Meter Battery Photoionization Deetector Tubing, Bonded 1/8 x 1/4 LDPE to 1/8 x 1/4 tel	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5 4.5 4.5 4.5 4.5	\$99 \$505 <b>Level Gau</b> ; \$1,300 \$160 \$45 \$325 \$245 \$85 \$100 \$90	Ea. Location Wk. Ea. Wk. Wk. Wk. Wk. Wk. Wk. Wk.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sul Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor Water Level Meter Turbidity Meter Battery Photoionization Deetector	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5 4.5 4.5 4.5 4.5	\$99 \$505 Level Gau; \$1,300 \$160 \$45 \$325 \$245 \$85 \$100 \$90 \$25 \$390 \$1.00	Ea. Location Wk. Ea. Wk. Wk. Wk. Wk. Wk. Wk. Ft.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience. SHA estimate, based on experience.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sul Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor Water Level Meter Turbidity Meter Battery Photoionization Deetector Tubing, Bonded 1/8 x 1/4 LDPE to 1/8 x 1/4 tel	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5 4.5 4.5 6.5 4.5 1000	\$99 \$505 Level Gau <sub>1</sub> \$1,300 \$160 \$45 \$325 \$245 \$100 \$90 \$25 \$390 \$1.00 \$0.15	Ea. Location Wk. Ea. Wk. Wk. Wk. Wk. Wk. Ft.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience. SHA estimate, based on experience.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sull Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor Water Level Meter Turbidity Meter Battery Photoionization Deetector Tubing, Bonded 1/8 x 1/4 LDPE to 1/8 x 1/4 tellined Tubing, 0.17 X 1/4 Teflon lined Tubing, 1/16 X 1/8 LDPE	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5 4.5 4.5 6.5 4.5 1000	\$99 \$505 Level Gau <sub>4</sub> \$1,300 \$160 \$45 \$325 \$245 \$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45	Ea. Location Wk. Ea. Wk. Wk. Wk. Wk. Wk. Ft. Ft.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monite event SHA estimate, based on experience. HAS estimate; Includes teflon bladder, check ballerings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience.
Water Level Gauging Event Labor Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)  Sull Sampling Event Labor  Bladder Pump Bladder Pump Expendables  YSI Low Flow Multi Meter Controller Compressor Water Level Meter Turbidity Meter Battery Photoionization Deetector Tubing, Bonded 1/8 x 1/4 LDPE to 1/8 x 1/4 tellined Tubing, 0.17 X 1/4 Teflon lined	34 1 btotal, Water 25 4.5 20 4.5 4.5 4.5 4.5 4.5 6.5 4.5 1000	\$99 \$505 Level Gau <sub>4</sub> \$1,300 \$160 \$45 \$325 \$245 \$85 \$100 \$90 \$25 \$390 \$1.00 \$0.15 \$1.45	Ea. Location Wk. Ea. Wk. Wk. Wk. Wk. Wk. Ft.	\$3,366 \$505 \$3,900 \$32,500 \$720 \$900 \$1,463 \$1,103 \$383 \$450 \$405 \$163 \$1,755 \$1,000	Based on 2006 Sampling Round Costs.  Assume 15% of labor cost  \$3,871  SHA estimate, unit cost based on 2006 Site monit event SHA estimate; lncludes teflon bladder, check ball rings and grab plates. SHA estimate, Assumes YSI 556 unit. SHA estimate, based on experience. SHA estimate, based on experience. SHA estimate; Assumes MP30 Drawdown Meter SHA estimate; Assumes HACH 2100P unit. SHA estimate, based on experience.

Detailed Cost Estimate for

 ${\bf Alternative~SW-3:~Groundwater~Collection~with~Ex-Situ~Treatment~of~Groundwater}$ 

#### Feasibility Study

Revision No.: 01 - DRAFT

Date: October 2007

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

PTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Investigation-Derived Waste Disposal					
55-gallon Non-Regulated rinse water	4	\$215	Ea.	\$860	N.E. Environmental Solutions, Inc. 2006 Fee Schedul
55-gallon high pH water	1	\$260	Ea.	\$260	N.E. Environmental Solutions, Inc. 2006 Fee Schedul
55-gallon Methanol & water	1	\$230	Ea.	\$230	N.E. Environmental Solutions, Inc. 2006 Fee Schedu
Pick-up Fee; (manifests, fuel, insurance)	2	\$300	Ea.	\$600	N.E. Environmental Solutions, Inc. 2006 Fee Schedu
Subtotal, In	vestigation-D	erived Wast	e Disposal	\$2,000	\$1,950
		Subtotal	, Engineer	\$60,000	\$60,332
Laboratory					
Chemical analysis, VOC by 8260B	35	\$110	Ea.		Alpha Woods Hole Labs 2006/2007 lab fees; See No 4.
Chemical analysis, SVOC by 8270	35	\$155	Ea.	\$5,425	Alpha Woods Hole Labs 2006/2007 lab fees; See No 4.
Chemical analysis, Metals	266	\$13	Ea.	\$3,458	Alpha Woods Hole Labs 2006/2007 lab fees; See No 4.
Courier	7	\$75	Day	\$525	Alpha Woods Hole Labs 2006/2007 lab fees.
Misc. (Lab disposal fees)	1	\$127			Assume 1 percent of total lab fees.
Contractor  Data Validation	33	\$290	Location	\$9,570	New Environmental Horizons, Inc. costs from 2006;
	33	\$290	Location	\$9,570	
					Unit cost based on number of sampling locations.
		Subtotal, 0	Contractor	\$9,600	\$9,570
Subtotal, Groundwa	nter and Surfa	ŕ		\$9,600 <b>\$83,000</b>	
,	nter and Surfa	nce Water M	Ionitoring	. ,	\$9,570
Subt Scope Contingency (15% Annual O&M Activities		nce Water M	Ionitoring	\$83,000 \$220,000	\$9,570 \$83,287 OSWER 5-6: Assume 15% of Annual O&M Activition
Subt Scope Contingency (15% Annual O&M Activities Subtotal) Bid Contingency (15% Annual O&M Activities		nce Water M	Ionitoring	\$83,000 \$220,000 \$33,000	\$9,570 \$83,287  OSWER 5-6: Assume 15% of Annual O&M Activitic Subtotal OSWER 5-6: Assume 15% of Annual O&M Activitic
Subt Scope Contingency (15% Annual O&M Activities Subtotal) Bid Contingency (15% Annual O&M Activities Subtotal)		oce Water M	Ionitoring ities Costs	\$83,000 \$220,000 \$33,000	\$9,570 \$83,287  OSWER 5-6: Assume 15% of Annual O&M Activitie Subtotal
Subtotal)  Scope Contingency (15% Annual O&M Activities Subtotal)  Bid Contingency (15% Annual O&M Activities Subtotal)  Subtotal, 6	otal, Annual	oce Water M	Ionitoring ities Costs	\$83,000 \$220,000 \$33,000 \$33,000	\$9,570 \$83,287  OSWER 5-6: Assume 15% of Annual O&M Activitic Subtotal OSWER 5-6: Assume 15% of Annual O&M Activitic
Subtotal)  Side Contingency (15% Annual O&M Activities Subtotal)  Bid Contingency (15% Annual O&M Activities Subtotal)  Subtotal, of Stessional/Technical Services  Project Management (10% Annual O&M Activities	otal, Annual	oce Water M	Ionitoring ities Costs	\$83,000 \$220,000 \$33,000 \$33,000 \$290,000	\$9,570 \$83,287  OSWER 5-6: Assume 15% of Annual O&M Activiti Subtotal OSWER 5-6: Assume 15% of Annual O&M Activiti Subtotal  OSWER 5-8: Assume 10% of Annual O&M Subtota
Subtotal)  Side Contingency (15% Annual O&M Activities Subtotal)  Bid Contingency (15% Annual O&M Activities Subtotal)  Subtotal, of Stational/Technical Services	otal, Annual	oce Water M	Ionitoring ities Costs	\$83,000 \$220,000 \$33,000 \$33,000 \$290,000	\$9,570 \$83,287  OSWER 5-6: Assume 15% of Annual O&M Activiti Subtotal OSWER 5-6: Assume 15% of Annual O&M Activiti Subtotal

\$360,000

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TOTAL, ANNUAL O&M COSTS

**Detailed Cost Estimate for** 

Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater

Feasibility Study

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

UNIT

QTY COSTS

UNITS

COMMENTS/REFERENCE COST

Activities Subtotal

Activities Subtotal

\$29,000

\$3,300 OSWER 5-6: Assume 15% of Every 5 Years O&M

Revision No.: 01 - DRAFT

Date: October 2007

DESCRIPTION PERIODIC COSTS

Construction/O&M

Every 5 Years O&M Activities

Environmetal Drilling (EDI) Invoice dated 11/06/03 N.E. Environmental Solutions, Inc. 2006 Fee Schedul
Environmetal Drilling (EDI) Invoice dated 11/06/03
Environmetal Drilling (EDI) Invoice dated 11/06/03
Environmetal Drilling (EDI) Invoice dated 11/06/03
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Environmetal Drilling (EDI) Invoice dated 11/06/03 Environmetal Drilling (EDI) Invoice dated 11/06/03
Environmetal Drilling (EDI) Invoice dated 11/06/03
Environmetal Drilling (EDI) Invoice dated 11/06/03
N.E. Environmental Solutions, Inc. 2006 Fee Schedu
N.E. Environmental Solutions, Inc. 2006 Fee Schedu
\$9,779
ECHOS 99 04 1201
SHA estimate, based on experience.
\$2,773
\$12,551
See Note 3.
Assumes 15% of oversight labor cost.
See Note 3
See Note 3. Assumes 5% of report preparation labor cost.
See Note 3. Assumes 5% of report preparation labor cost.
Assumes 5% of report preparation labor cost.
Assumes 5% of report preparation labor cost. \$9,908
_

Activities Subtotal)

Activities Subtotal)

Bid Contingency (15% of Every 5 Years O&M

Subtotal, Every 5 Year O&M Activities with Contingencies

Detailed Cost Estimate for

Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

UNIT
QTY COSTS UNITS COST COMMENTS/REFERENCE

Year 100 Construction/O&M Activities

Decomissioning of Monitoring Network (year 100 only)

DESCRIPTION

Equipment Mobilization	1	\$260	L.S.	\$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	54	\$1,275	Day	\$68,850	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	2,700	\$5	L.F.	\$13,500	Environmetal Drilling (EDI) Invoice dated 11/06/03
		Cubtotal (	Yamanaaa	\$62,000	¢02 250

**Subtotal, Contractor** \$82,000 \$82,356

\$150,000

\$149,977

Revision No.: 01 - DRAFT

Date: October 2007

#### Engineer

Labor, Oversight	594	\$99	Hr.	\$58,806	See Note 3.
Misc. Expenses (e.g. mileage. telephone,	1	\$8,821	L.S.	\$8,821	Assume 15% of labor cost
reproduction, postage, personal protective					
equipment, etc.)					
		Subtotal	, Engineer	\$68,000	\$67,627

#### Decomissioning of Groundwater Treatment System (year 100 only)

Subtotal, Decomissioning of Monitoring Network (year 100 only)

tractor  Decomission Treatment System Equipment & Bu	ıilding				
Remove/Dispose of treatment system equipment (e.g., tanks, pumps, fliter press, etc.)	1	\$53,315	L.S.	\$53,315	SHA estimate; assumes approximately 25% of cost fo installation & setup.
Small building demolition	13650	\$0.36	C.F	\$4,914	Means 02 41 16.13 0500; Assumes building dimensions 35'x30'x13' (ave. height)
Transportation and disposal of building debris	30	\$70	Tons	\$1,632	SHA discussions with Waste Management, Inc.
Remove slab on grade, 9" to 12"	1050	\$2	S.F	\$2,212	ECHOS 16 01 0124
Load concrete debris, 926, 2.0 CY, Wheel Loader	8	\$204	Hr.	\$1,632	ECHOS 17 03 0222
Transportation and disposal of concrete demolition debris (with rebar)	59	\$70	Tons	\$1,632	SHA discussions with Waste Management, Inc.
Subtotal, Treatment	System E	quipment &	Building	\$65,000	\$65,337
<b>Decomission Utilities</b>					
Dismantle electrical systems	1	\$43,750	L.S.	\$43,750	SHA estimate; assumes approximately 25% of cost for installation.
Dismantle water supply	1	\$4,066	L.S.	\$4,066	SHA estimate; assumes approximately 25% of cost for installation.

**Subtotal, Utilities** \$48,000 \$47,816

**Detailed Cost Estimate for** 

 ${\bf Alternative~SW-3:~Groundwater~Collection~with~Ex-Situ~Treatment~of~Groundwater}$ 

#### Feasibility Study

Revision No.: 01 - DRAFT

Date: October 2007

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

PTION		OTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
	Decomission Extraction Trench, Piping & Discha	•		CIVIII	COSI	COMMENTO/REFERENCE
	Strip Soil Cap & Stockpile Material, 1-1/2 C.Y.	101		C.Y.	\$1,212	ECHOS 17 03 0276; Assumes H&S level C.
	excavator, Medium Material					
	Excavating Trench, common earth, 14' to 20' deep,	50	\$7.34	C.Y.	\$367	Means 31 23 16.13 1382; Assumes trench of 200'1
	1-1/2 C.Y. excavator with trench box					by 3' wide by 15' deep; Assumes H&S level C.
	Excavating Trench, common earth, 4' to 6' deep, 1-1/2 C.Y. excavator with trench box	50	\$6.50	C.Y.	\$325	Means 31 23 16.13 1360; Assumes approximately feet of trench approximately 3' wide by 5' deep; Assumes H&S level C.
	Water Truck	40	\$146	Hr.	\$5,840	ECHOS Crew Code COKBM (Modified); Assume: H&S level C.
	Sprayed Water Dust Suppressant	1,360	\$0.06	SF	\$82	ECHOS 33 08 0585; Assumes H&S level C.
	10,000 gal Fractionation Tank (coated interior)	1,500		Week		Rain for Rent, Inc. Quote dated 09/20/07
	3" Trash Pump with Fittings	1		Week		Rain for Rent, Inc. Quote dated 09/24/07
	Additional Hose, 90 feet	1		Week		Rain for Rent, Inc. Quote dated 09/24/07
	Remove Plastic Pipe	581		L.F.		ECHOS 16 01 0625
	Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y.	474	\$2.34			Means 31 23 16.13 3080; Assumes trench of 200' lo
	bucket, 100' haul		,		+-,	by 3' width by 15' deep; Assumes H&S level D.
	Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	474	\$8.33	C.Y.	\$3,949	ECHOS 17 03 0511; Assumes H&S level D.
	Unclassified Fill, Delivered, Off-site	222	\$12	C.Y.	\$2,667	ECHOS 02223 1001
	Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	3	\$26	M.S.F.	\$79	Means 32 92 19.13 0800
	Subtotal, Extraction Trend	h, Piping	& Dischar	ge Outfall	\$34,000	\$33,936
			Subtotal, 6	Contractor	\$150,000	\$147,089
Engin	ieer					
Engin		220	\$99	hr	\$21,780	Assumes 1 month of field work; See Note 3.
	Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective	220	\$99 \$3,267			Assumes 1 month of field work; See Note 3. Assume 15% of labor cost
	Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Labor, Groundwater Treatment System Close-out			l.s.	\$3,267	
	Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Labor, Groundwater Treatment System Close-out Report Preparation Misc. Office Expenses (e.g., reproduction,	1	\$3,267	l.s. Hr.	\$3,267 \$6,200	Assume 15% of labor cost
	Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Labor, Groundwater Treatment System Close-out Report Preparation	50	\$3,267 \$124 \$310	l.s. Hr. L.S.	\$3,267 \$6,200 \$310	Assume 15% of labor cost  See Note 3.  Assume 5% of report preparation labor cost.
	Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Labor, Groundwater Treatment System Close-out Report Preparation Misc. Office Expenses (e.g., reproduction,	50	\$3,267 \$124 \$310	l.s. Hr.	\$3,267 \$6,200	Assume 15% of labor cost  See Note 3.
	Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Labor, Groundwater Treatment System Close-out Report Preparation Misc. Office Expenses (e.g., reproduction,	50	\$3,267 \$124 \$310 <b>Subtotal</b>	Hr. L.S.	\$3,267 \$6,200 \$310	Assume 15% of labor cost  See Note 3.  Assume 5% of report preparation labor cost.
	Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Labor, Groundwater Treatment System Close-out Report Preparation Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	50 1 atment Sy	\$3,267 \$124 \$310 Subtotal	Hr. L.S. L.G., Engineer	\$3,267 \$6,200 \$310 \$32,000	Assume 15% of labor cost  See Note 3.  Assume 5% of report preparation labor cost.  \$31,557
	Labor, Oversight Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.) Labor, Groundwater Treatment System Close-out Report Preparation Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Subtotal, Decomissioning of Groundwater Tree Subtotal, Year 100  Contingency (15% of Year 100 O&M Activities	50 1 atment Sy	\$3,267 \$124 \$310 Subtotal	Hr. L.S. L.G., Engineer	\$3,267 \$6,200 \$310 \$32,000 \$180,000	Assume 15% of labor cost  See Note 3.  Assume 5% of report preparation labor cost.  \$31,557  \$178,646

Subtotal, Periodic Construction/O&M Costs

\$460,000

Detailed Cost Estimate for

Revision No.: 01 - DRAFT

Date: October 2007

#### ${\bf Alternative~SW-3:~Groundwater~Collection~with~Ex-Situ~Treatment~of~Groundwater}$

#### Feasibility Study

### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

UNIT DESCRIPTION COMMENTS/REFERENCE COSTS UNITS COST OTY **Professional/Technical Services** Project Management (10% of Periodic O&M Activities \$46,000 OSWER 5-8: Assume 10% of Periodic O&M Subtotal Subtotal w/Contingencies) including contingencies Technical Support (15% of Periodic O&M Activities \$69,000 OSWER 5-8: Assume 15% of Periodic O&M Subtotal Subtotal w/Contingencies) including contingencies Five-Year Review Engineer \$12,400 L.S. \$12,400 Unit cost assumes 100 labor hours at an average rate of Labor \$124/hr. See Note 3.

\$620 L.S.

Subtotal, Engineer

1

Subtotal, Five-Year Review \$13,000

**Tive-Year Review** \$13,000 \$13,020

\$13,000

\$620 Assume 5% of labor costs.

\$13,020

Subtotal, Professional/Technical Services \$130,000

TOTAL, PERIODIC COSTS \$590,000

Abbreviations:

 $B.C.Y. = bank \ cubic \ yards \qquad Hr. = hour \qquad L.S. = lump \ sump \qquad S.F. = square \ feet \\ C.Y. = cubic \ yards \qquad L.C.Y. = loose \ cubic \ yards \qquad Mo. = month \qquad S.Y. = square \ yard$ 

Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Misc Expenses (e.g., reproduction, telephone,

#### Notes:

1. "Means" refers to one of the following:

postage, etc.)

RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition. RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition. ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the former mill tailrace quantity estimates:
  - a.) We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y. volume.
  - b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.



File No. 2032.01 Page 1 of 2

Project Blackburn and Union Privileges Superfund Site

Location Walpole, Massachusetts

Subject Preliminary Groundwater Treatment System Design Calculations: Sludge Processing

Calculated By Rene E. Nahlik
Checked By David Shea, P.E.

Date 10/19/2007

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#### pH ADJUSTMENT

<u>Objective:</u> Lower the pH of extracted groundwater to value compatible with treatment train and effluent discharge criteria.

1. Estimate concentration of hydrochloric acid (HCl) required to neutralize alkalinity.

#### **Assumptions:**

- a. Influent alkalinity concentration of 1,541 mg/L as  $CaCO_3$ . See Appendix C.2 for discussion of estimated treatment system influent concentrations.
- b. Assume all  $CO_3^{-2}$  must be converted to  $HCO_3^{-}$ .

$$H^+ + Cl^- \Leftrightarrow HCl$$
  
 $HCO_3^- \Leftrightarrow CO_3^{-2} + H^+$ 

#### Calculations:

a. 1,541 mg/L 
$$CaCO_3 * \left(\frac{2meq/molCaCO_3}{100mg/mol}\right) = 30.8 \text{ meq/L or } 0.03 \text{ eq/L}$$

b. [HCl] required (eq/L) = 
$$[CaCO_3^{-2}] = 0.03 \text{ eq/L} = 0.03 \text{ mol/L}$$

c. 
$$[HC1] = 0.03 \text{ mol/L} * 36.5 \text{ g/mol} = 1.1 \text{ g/L or } \underline{1,100 \text{ mg/L}}$$

2. Estimate concentration of HCl required to lower pH of extracted groundwater to value compatible with treatment train and effluent discharge criteria, say 7.5 S.U.

#### Calculations:

a. 
$$pH = -log[H^+] \text{ or } [H^+] = 10^{-pH}$$

b. 
$$[H^+] = 10^{-7.5} = 3.16 \times 10^{-8} \text{ mols/L}$$

c. 
$$[HC1] = [H^+] = 3.16 \times 10^{-8} \text{ mols/L} * 36.5 \text{ g/mol} = 1.15 \times 10^{-6} \text{ g/L or } 1.15 \times 10^{-3} \text{ mg/L}$$

#### 3. Estimate feed rate of HCl.

#### Assumptions:

a.  $1{,}100 \text{ mg/L}$  (from Calculation #1) >>  $1.15 \times 10^{-3} \text{ mg/L}$  (from Calculation #2), therefore, HCl demand is driven by alkalinity of extracted groundwater.



File No. 2032.01 Page 2 of 2

Project Blackburn and Union Privileges Superfund Site

Location Walpole, Massachusetts

Subject Preliminary Groundwater Treatment System Design Calculations: Sludge Processing

 Calculated By
 Rene E. Nahlik
 Date 10/19/2007

 Checked By
 David Shea, P.E.
 Date 10/19/2007

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- b. 35% by weight solution of (HCl) with a specific gravity of 1.19.
- c. Groundwater treatment system flow rate of 10 gpm. See Section 4.1.4.2 of the report.

#### Calculations:

a.Bulk density of HCl: 
$$1.19 \text{g/cm}^3 * \left(\frac{1lb}{453.6g}\right) * 3,785 \text{cm}^3 / \text{gal} = \underline{\textbf{9.9 lbs/gal}}$$

b. HCl Feed Rate: 
$$\left(\frac{C*Q}{2,000*\rho*\%wt}\right)$$

where, C = chemical concentration (mg/L)

Q = flowrate (gpm)

2,000 = units conversion factor

 $\rho$  = bulk density of solution (lbs/gal)

% wt = chemical weight percent of solution

HCl Feed Rate: 
$$\left(\frac{1,100*10}{2,000*9.9*0.35}\right) = \underline{1.6 \text{ gal/hr.}}$$
 or  $\underline{14,000 \text{ gal/yr}}$ 



File No. 2032.01 Page 1 of 2

Project Blackburn and Union Privileges Superfund Site

Location Walpole, Massachusetts

Subject Preliminary Groundwater Treatment System Design Calculations: Permanganate Usage Calculated By Rene E. Nahlik Date 10/19/200

Checked By David Shea, P.E. Date 10/19/2007

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#### PERMANGANATE USAGE

<u>Objective:</u> Regenerate GreenSand filtration media using continuous permanganate (e.g., sodium permanganate) loading and periodic backwash operations.

1. Estimate permanganate  $(MnO_{\scriptscriptstyle A}^{\scriptscriptstyle -})$  demand for GreenSand filtration media regeneration.

#### Assumptions:

- a. Influent concentrations of iron and manganese are 1.84 mg/L and 0.115 mg/L, respectively. See Appendix C.2 for discussion of estimated treatment system influent concentrations.
- b.  $MnO_4^-$  demand is approximately equal to  $(1 * [Fe^{+3}]) + (2 * [Mn^{+4}])$ , based on information provided by Siemens Corporation, supplier of the GreenSand filtration system.

#### Calculations:

a.  $MnO_4^-$  Demand: (1 \* 1.84 mg/L) + (2 \* 0.115 mg/L) = 2.1 mg/L

#### 2. Estimate feed rate of KMnO<sub>4</sub>.

#### Assumptions:

- a. 20% by weight solution of sodium permanganate ( $NaMnO_4$ ) with a specific gravity of 1.16.
- b. Groundwater treatment system flow rate of 10 gpm. See Section 4.1.4.2 of the report.

#### Calculations:

a. Bulk density of 
$$NaMnO_4$$
: 1.16g/cm<sup>3</sup> \*  $\left(\frac{1lb}{453.6g}\right)$  \* 3,785 $cm^3$  /  $gal =$ **9.7 lbs/gal**

b. 
$$NaMnO_4$$
 Feed Rate:  $\left(\frac{C*Q}{2,000*\rho*\%wt}\right)$ 

where, C = chemical concentration (mg/L)

Q = flowrate (gpm)

2,000 = units conversion factor

 $\rho$  = bulk density of solution (lbs/gal)

% wt = chemical weight percent of solution



File No. 2032.01 Page 2 of 2

Project Blackburn and Union Privileges Superfund Site

Location Walpole, Massachusetts

Subject Preliminary Groundwater Treatment System Design Calculations: Permanganate Usage
Calculated By Rene E. Nahlik
Date 10/19/2007

Checked By David Shea, P.E. Date 10/19/2007

\\192.168.127.29\condata\CONDATA\2000s\2032.01\Originals\FS Report - Draft V1\Appendices\Appendix\_D\20071019 KMnO4 Calcs.doc

$$NaMnO_4$$
 Feed Rate:  $\left(\frac{2.1*10}{2,000*9.7*0.20}\right) = \underline{\textbf{0.0055 gal/hr,}}$  or  $\underline{\textbf{48 gal/yr}}$ 

#### 3. Estimate size of backwash receiving tank.

#### Assumptions:

- a. Typical backwash rate of 12 gpm/ft², based on information provided by National Drinking Water Clearinghouse, West Virginia University.
- b. Typical backwash cycle run of 15 minutes per cycle, based on information provided by National Drinking Water Clearinghouse, West Virginia University.
- c. The cross-sectional area of GreenSand filtration vessel(s) is 1.1 ft<sup>2</sup> (vessel diameter = 14 inches), based on information provided by Siemens Corporation, supplier of the GreenSand filtration system.

#### **Calculations:**

a. Backwash rate: 
$$12 \text{ gpm/ft}^2 * 1.1 \text{ ft}^2 = 13.2 \text{ gpm}$$

b. Amount of water generated during backwash cycle:

c. Backwash receiving tank size: 198 gals \* 1.5 safety factor = 297 gals



File No. 2032.01 Page 1 of 3 Project Blackburn and Union Privileges Superfund Site

Location Walpole, Massachusetts

Checked By David Shea, P.E.

Subject Preliminary Groundwater Treatment System Design Calculations: Permanganate Usage Date 10/19/2007 Calculated By Rene E. Nahlik Date 10/19/2007

\\192.168.127.29\condata\CONDATA\2000s\2032.01\Originals\FS Report - Draft V1\Appendices\Appendix\_D\20071019 Electricity Calcs.doc

#### **ELECTRICITY USAGE**

#### Objective: Estimate utilities costs for proposed groundwater treatment system.

1. Estimate electricity usage for groundwater treatment system.

#### Assumptions:

- a. Major system components contributing to electricity demand include electrical system pumps/motors, specifically:
  - i. Extraction trench water pump (approx. ½ HP)
  - ii. Equalization tank water pump (approx. ½ HP)
  - iii. Backwash receiving tank water pump (approx. 1 HP)
  - iv. HCl chemical feed pump (approx. ½ HP)
  - v. NaMnO<sub>4</sub> chemical feed pump (approx. ½ HP)
  - vi. System air compressor (approx. 15 HP)
- b. Conservatively, assume that all system pumps/motors listed above operate continuously, with the exception of the system air compressor. Assume that the system air compressor runs continuously during backwash cycles, and an additional 0.5 hours per day for miscellaneous compressed air operations.
- c. Typical backwash cycle run of 15 minutes per cycle and a cycle frequency of approximately 18 hours, based on information provided by National Drinking Water Clearinghouse, West Virginia University.
- d. Assume efficiency of 3-phase motors to be 85%.

#### Calculations:

a. For continuously-operating system components:

Total Power Demand = 
$$\left(\frac{\text{Total HP} * 0.746 \text{ kW/HP}}{0.85}\right) = \left(\frac{3 * 0.746 \text{ kW/HP}}{0.85}\right) = \underline{\textbf{2.63 kW}}$$

b. For continuously-operating system components:

c. For intermittently-operating system components:

Total Power Demand = 
$$\left(\frac{\text{Total HP} * 0.746 \text{ kW/HP}}{0.85}\right) = \left(\frac{15 * 0.746 \text{ kW/HP}}{0.85}\right)$$



File No. 2032.01 Page 2 of 3

Project Blackburn and Union Privileges Superfund Site

Location Walpole, Massachusetts

Subject Preliminary Groundwater Treatment System Design Calculations: Permanganate Usage Calculated By Rene E. Nahlik Date 10/19/200

Checked By David Shea, P.E. Date 10/19/2007

1 = 13.2 kW

d. For intermittently-operating system components:

Annual Electricity Usage = Total Power Demand \* hours of operation

= 13.2 kW \* [(487 backwash cycles/yr \* 0.25 hrs/backwash cycle) + (0.5 hrs/day \* 365 days/yr)]

= 4,016 kW-hr/yr

2. Estimate electricity usage for heating treatment system building.

## **Assumptions:**

- a. 6,012 heating degree days (HDD) for Walpole, Massachusetts (NOAA, 2007).
- b. Assume proposed treatment building dimension of 35 ft x 30ft x 10ft and surface area of 2,350 ft<sup>2</sup>.
- c. Assume R-19 insulation on walls and ceiling (rating: 19 hr-ft2-degF).

## Calculations:

a. Annual Electricity Usage:  $\left(\frac{\text{Surface Area* HDD* 24 hrs/day}}{19hr \cdot ft^2 \cdot \deg F * 3,412BTU / kW \cdot hr}\right)$ 

$$\left(\frac{2,350*6,012*24 \text{ hrs/day}}{19hr \cdot ft^2 \cdot \text{deg } F*3,412BTU/kW \cdot hr}\right) = 5,230 \text{ kW-hr}$$

3. Estimate annual electricity cost for operating/maintaining proposed groundwater treatment system.

## Assumptions:

- a. Unit cost of electricity of \$0.1218 /kW-hr (EIA/DOE, 2007)
- b. Assume miscellaneous electricity usage (e.g., lights, minor system components, etc.) are equal to approximate 25% of estimated electricity usage (from Calculations #1 & #2).



File No. 2032.01 Page 3 of 3

Project Blackburn and Union Privileges Superfund Site

Location Walpole, Massachusetts

Subject Preliminary Groundwater Treatment System Design Calculations: Permanganate Usage
Calculated By Rene E. Nahlik Date 10/19/2007

Checked By David Shea, P.E. Date 10/19/2007

\\192.168.127.29\condata\CONDATA\2000s\2032.01\Originals\FS Report - Draft V1\Appendices\Appendix\_D\20071019 Electricity Calcs.doc

## **Calculations:**

a. Total Annual Electricity Usage = Annual electricity usage for continuously-operating system components + Annual electricity usage for intermittently-operating system components + Annual electricity usage for heating system + Misc. electricity usage

Total Annual Electricity Usage = 23,065 kW-hr/yr + 4,016 kW-hr/yr + 5,230 kW-hr + 8,078 kW-hr

= 40,389 kW-hr

b. Total Annual Electricity Cost = 40,389 kW-hr \* \$0.1218 /kW-hr = \$4,919, say \$5,000

# APPENDIX D-2 SO ALTERNATIVE COST ESTIMATES

# Appendix D-2a

**Cost Estimates for Alternative SO-2** 

# Cost Estimate Summary for Alternative SO-2: Limited Action

# Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

# CAPITAL COST

CAPITAL COST	
Construction Activities	
Implementation Plans/Submittals	\$11,000
Install Security Fence	
Contractor	\$110,000
Subtotal, Install Security Fence	\$110,000
Soil Vapor Monitoring Point Installation	
Contractor	\$2,900
Engineer	\$1,500
Subtotal, Soil Vapor Monitoring Point Installation	\$4,400
Post-Construction Submittals/As-Builts	\$5,500
Subtotal, Construction Activities	\$130,000
Scope Contingency (15% Construction Activities Subtotal)	\$20,000
Bid Contingency (15% Construction Activities Subtotal)	\$20,000
Subtotal, Construction Activities with Contingencies	\$170,000
Professional/Technical Services	
Project Management (8% Construction Activities Subtotal w/Contingencies)	\$14,000
Remedial Design (15% Construction Activities Subtotal w/Contingencies)	\$26,000
Construction Management (10% Construction Activities Subtotal w/Contingencies)	\$17,000
Subtotal, Professional/Technical Services	\$57,000
Institutional Controls	
Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	\$15,000
TOTAL, CAPITAL COSTS	\$240,000
ANNUAL O&M COSTS	
O&M Activities	
Maintain Cap/Cover	
Earthwork Contractor (Assume 1 visit annually)	
Mobilization/Demobilization	\$690
Repairs to Soil Cover	\$1,600
Pavement Restoration	\$11,200
Subtotal, Earthwork Contractor	\$14,000
Landscaping Contractor (Assume 2 visits annually)	\$500
Engineer	\$7,400
Subtotal, Maintain Cap/Cover	\$21,000

# Cost Estimate Summary for Alternative SO-2: Limited Action

# Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

Soil Vapor Monitoring	
Engineer	\$4,000
Laboratory	\$1,700
Subtotal, Soil Vapor Monitoring	\$5,700
Subtotal, O&M Activities	\$27,000
Scope Contingency (15% O&M Activities Subtotal)	\$4,100
Bid Contingency (15% O&M Activities Subtotal)	\$4,100
Subtotal, O&M Activities with Contingencies	\$35,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$3,500
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$5,300
Subtotal, Professional/Technical Services	\$8,800
TOTAL, ANNUAL O&M COSTS	\$44,000
PERIODIC COSTS Construction/O&M Activities	
Every 5 Years O&M Activities	
Maintain Security Fencing (every 5 years)	\$10,000
Soil Vapor Monitoring Point Maintenance (every 5 years)	
Contractor	\$2,600
Engineer	\$1,100
Subtotal, Soil Vapor Monitoring Point Maintenance (every 5 years)	\$3,800
Subtotal, Every 5 Years O&M Activities	\$14,000
Scope Contingency (15% Every 5 Years O&M Activities Subtotal)	\$2,100
Bid Contingency (15% Every 5 Years O&M Activities Subtotal)	\$2,100
Subtotal, Every 5 Years O&M Activities with Contingencies	\$18,000
Subtotal, Construction/O&M Activities	\$18,000
Professional/Technical Services	
Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)	\$1,800
Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies)	\$2,700
Five-Year Review	\$13,000
Subtotal, Professional/Technical Services	\$18,000
TOTAL, PERIODIC COSTS	\$36,000

# Cost Estimate Summary for Alternative SO-2: Limited Action Feasibility Study Blackburn & Union Privileges Superfund Site

# Walpole, Massachusetts

## PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	Total Cost	Total Cost Per Year	<u>Discount</u> <u>Factor</u>	Present Value
Capital Costs	0	\$240,000	\$240,000	1	\$240,000
Annual O&M Costs	1-100	\$4,400,000	\$44,000	14.3	\$630,000
Periodic Costs	5	\$36,000	\$36,000	0.713	\$26,000
Periodic Costs	10	\$36,000	\$36,000	0.508	\$18,000
Periodic Costs	15	\$36,000	\$36,000	0.362	\$13,000
Periodic Costs	20	\$36,000	\$36,000	0.258	\$9,300
Periodic Costs	25	\$36,000	\$36,000	0.184	\$6,600
Periodic Costs	30	\$36,000	\$36,000	0.131	\$4,700
Periodic Costs	35	\$36,000	\$36,000	0.0937	\$3,400
Periodic Costs	40	\$36,000	\$36,000	0.0668	\$2,400
Periodic Costs	45	\$36,000	\$36,000	0.0476	\$1,700
Periodic Costs	50	\$36,000	\$36,000	0.0339	\$1,200
Periodic Costs	55	\$36,000	\$36,000	0.0242	\$870
Periodic Costs	60	\$36,000	\$36,000	0.0173	\$620
Periodic Costs	65	\$36,000	\$36,000	0.0123	\$440
Periodic Costs	70	\$36,000	\$36,000	0.00877	\$320
Periodic Costs	75	\$36,000	\$36,000	0.00625	\$230
Periodic Costs	80	\$36,000	\$36,000	0.00446	\$160
Periodic Costs	85	\$36,000	\$36,000	0.00318	\$110
Periodic Costs	90	\$36,000	\$36,000	0.00227	\$82
Periodic Costs	95	\$36,000	\$36,000	0.00162	\$58
Periodic Costs	100	\$36,000	\$36,000	0.00115	\$41

#### TOTAL PRESENT VALUE OF ALTERNATIVE

<del>-----</del>

\$960,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-2a.2 **Detailed Cost Estimate for**  Revision No.: 01 - DRAFT

Date: October 2007

#### **Alternative SO-2: Limited Action** Feasibility Study

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

imited Action IPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
AL COSTS	•				
onstruction Activities					
Implementation Plans/Submittals	1	\$11,000	Ea.	\$11,000	SHA estimate
Install Security Fence					
Contractor					
Clearing, Medium Brush with Average Grub & Some Trees	1.3	\$1,254	Acre	\$1,630	ECHOS 17 01 0103; Assumes distance of 2,800 feet 20 feet wide will be cleared at same level of effort at 1.3 acre.
Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	2,800	\$36	L.F.	\$100,800	Means 32 31 13.20 0500
Double swing gates, incl. posts & hardware, 20' wide, galv. steel	2	\$2,042	Ea.	\$4,084	Means 32 31 13.20 5070
Gate for 6' high fence, 1-5/8" frame, 3' wide, galv. steel	6	\$358	Ea.		Means 32 31 13.20 1400
	S	Subtotal, C	Contractor _	\$110,000	\$108,662
Si	ıbtotal, In	stall Secu	rity Fence	\$110,000	\$108,662
Soil Vapor Monitoring Point Installation  Contractor					
Mob./Demob., Equipment & Staff	1	\$525	L.S.	\$525	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
ATV/Track-Mtd. Direct Push System, 1-2 operators, 8-hrs/day	1	\$1,495	Day	\$1,495	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor/Soil Sampling Expendable Pkg (per day)	1	\$200	Day	\$200	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor Implant Installation (includes vapor pt, screen, tubing, glass beads, bentonite seal)	4	\$95	Ea.	\$380	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Travel Costs - DP Services	2	\$150	Ea.	\$300	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
	S	Subtotal, C	Contractor	\$2,900	\$2,900
Engineer					
Labor	13	\$99	Hr.	\$1.287	See Note 3.
Misc. Field Expenses (e.g. mileage, field supplies, PPE, telephone, etc.)	1	\$194			Assume 15% of labor cost.
		Subtotal	, Engineer	\$1,500	\$1,481
Subtotal, Soil Vapor	Monitorii	ng Point I	nstallation	\$4,400	\$4,381
Post-Construction Submittals/As-Builts	1	\$5,500	Ea.	\$5,500	SHA estimate
Sul	ototal, Co	nstruction	Activities	\$130,000	
Scope Contingency (15% Construction Activities Subtotal)				\$20,000	OSWER 5-6: Assume 15% of Construction Activiti Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$20,000	OSWER 5-6: Assume 15% of Construction Activit Subtotal
Subtotal, Construction	Activities	with Con	tingencies	\$170,000	
ofessional/Technical Services					
Project Management (8% Construction Activities				\$14,000	OSWER 5-8: Assume 8% of Construction Activities
Subtotal w/Contingencies) Remedial Design (15% Construction Activities Subtotal				\$26,000	Subtotal including contingencies OSWER 5-8: Assume 15% of Construction Activit
w/Contingencies)  Construction Management (10% Construction					Subtotal including contingencies OSWER 5-8: Assume 10% of Construction Activit

# TABLE D-2a.2 Detailed Cost Estimate for Alternative SO-2: Limited Action

Revision No.: 01 - DRAFT Date: October 2007

Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-2: Limited Action

DESCRIPTION QTY COSTS UNITS COST COMMENTS/REFERENCE Institutional Controls
Establish Deed Restrictions

Engineer

Establish Institutional Controls in the form of Deed Restrictions

SHA estimate; Costs estimated based on number of properties requiring deed restrictions.

Subtotal, Engineer \$15,000

Subtotal, Establish Deed Restrictions \$15,000

Subtotal, Institutional Controls \$15,000

TOTAL, CAPITAL COSTS \$240,000

ANNUAL O&M COSTS

**O&M** Activities

Maintain Cap/Cover

\$126 \$55 \$27 epairs to \$5.71 \$25 \$2.93	Ea.  Ea.  obilization  Hr.  C.Y.  M.S.F.  Soil Cover  S.Y.  Ton  S.F.  L.C.Y	\$104 \$200 \$690 \$1,008 \$550 \$22 \$1,600 \$1,662 \$906 \$7,650	ECHOS Crew Code COBBC ECHOS 08 05 0301 Means 32 92 19.13 0800  \$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually. SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$200 tion/Dem \$126 \$55 \$27 epairs to \$5.71 \$2.93	Ea.  obilization  Hr.  C.Y.  M.S.F.  Soil Cover  S.Y.  Ton  S.F.  L.C.Y	\$200 \$690 \$1,008 \$550 \$22 \$1,600 \$1,662 \$906 \$7,650	mob/demob ECHOS 33 17 0801 \$688  ECHOS Crew Code COBBC ECHOS 08 05 0301 Means 32 92 19.13 0800  \$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually. SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$126 \$55 \$27 <b>epairs to</b> \$5.71 \$2.93	Hr. C.Y. M.S.F.  Soil Cover  S.Y.  Ton S.F.  L.C.Y	\$1,008 \$550 \$22 \$1,600 \$1,662 \$906 \$7,650	\$688  ECHOS Crew Code COBBC ECHOS 08 05 0301 Means 32 92 19.13 0800  \$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually. SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$126 \$55 \$27 <b>epairs to</b> \$5.71 \$2.93	Hr. C.Y. M.S.F. Soil Cover  S.Y. Ton S.F. L.C.Y	\$1,008 \$550 \$22 \$1,600 \$1,662 \$906 \$7,650	ECHOS Crew Code COBBC ECHOS 08 05 0301 Means 32 92 19.13 0800  \$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually. SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$55 \$27 <b>Lepairs to</b> \$5.71 \$25 \$2.93	C.Y. M.S.F.  Soil Cover  S.Y.  Ton S.F.  L.C.Y	\$550 \$22 \$1,600 \$1,662 \$906 \$7,650	ECHOS 08 05 0301 Means 32 92 19.13 0800  \$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually.  SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$55 \$27 <b>Lepairs to</b> \$5.71 \$25 \$2.93	C.Y. M.S.F.  Soil Cover  S.Y.  Ton S.F.  L.C.Y	\$550 \$22 \$1,600 \$1,662 \$906 \$7,650	ECHOS 08 05 0301 Means 32 92 19.13 0800  \$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually.  SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$55 \$27 <b>Lepairs to</b> \$5.71 \$25 \$2.93	C.Y. M.S.F.  Soil Cover  S.Y.  Ton S.F.  L.C.Y	\$550 \$22 \$1,600 \$1,662 \$906 \$7,650	ECHOS 08 05 0301 Means 32 92 19.13 0800  \$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually.  SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$27 epairs to \$5.71 \$25 \$2.93	Soil Cover  S.Y.  Ton S.F.  L.C.Y	\$1,600 \$1,662 \$906 \$7,650	Means 32 92 19.13 0800  \$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually.  SHA discussions with Waste Management, Inc.  Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$5.71 \$25 \$2.93	S.Y. Ton S.F. L.C.Y	\$1,600 \$1,662 \$906 \$7,650	\$1,580  Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually.  SHA discussions with Waste Management, Inc.  Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$5.71 \$25 \$2.93	S.Y.  Ton S.F.  L.C.Y	\$1,662 \$906 \$7,650	Means 02 41 13.17 5100; Assumes 5% of paved area replaced annually.  SHA discussions with Waste Management, Inc.  Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$25 \$2.93	Ton S.F. L.C.Y	\$906 \$7,650	replaced annually. SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$25 \$2.93	Ton S.F. L.C.Y	\$906 \$7,650	replaced annually. SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$25 \$2.93	Ton S.F. L.C.Y	\$906 \$7,650	replaced annually. SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$2.93 \$14	S.F.	\$7,650	SHA discussions with Waste Management, Inc. Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
\$14	L.C.Y	\$7,650	Means 32 12 16.14 0020; Assumes 5% of paved area replaced annually.
	_		replaced annually.
	_	\$1.015	24 22 22 42 42 5
vement R		Ψ1,015	Means 31 23 23.18 1255
	estoration	\$11,200	\$11,234
rthwork (	Contractor	\$14,000	\$13,501
\$250.00	M.S.F.	\$250	SHA estimate.
			SHA estimate.
lscaping (	Contractor	\$500	\$500
\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
\$594	L.S.	\$594	Assume 15% of field labor cost.
\$124	Hr.	\$2,728	See Note 3.
\$137	L.S.	\$137	Assume 5% of report preparation labor cost.
	\$990 \$594 \$124	\$250.00 M.S.F.	\$990         Ea.         \$3,960           \$594         L.S.         \$594           \$124         Hr.         \$2,728

Subtotal, Maintain Cap/Cover \$21,000

\$21,420

TABLE D-2a.2 **Detailed Cost Estimate for Alternative SO-2: Limited Action**  Revision No.: 01 - DRAFT

Date: October 2007

# Blackburn & Union Privileges Superfund Site

Feasibility Study Walpole, Massachusetts

SO-2: Limited Action

IPTION Soil Vapor Monitoring	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor, Soil Vapor Sampling	10	\$99	Hr.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149	L.S.	\$149	Assume 15% of labor cost.
Labor, Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$136	L.S.	\$136	Assume 5% of labor cost.
<u> </u>		Subtotal	, Engineer	\$4,000	\$4,003
Laboratory					
Chemical analysis, VOCs (Method TO-15)	6	\$285	Ea.	\$1,710	2006-2007 Fee Schedule, Alpha Woods Hole Labs.
			<u> </u>	04.500	Includes equipment rental.
	S	ubtotal, L	aboratory	\$1,700	\$1,710
Si	ubtotal, So	il Vapor N	Ionitoring	\$5,700	\$5,713
Si	ŕ	•	Monitoring  Activities	\$5,700 \$27,000	\$5,713
Scope Contingency (15% O&M Activities Subtotal)	ŕ	•		\$27,000	
	ŕ	•		<b>\$27,000</b> \$4,100	\$5,713  OSWER 5-6: Assume 15% of O&M Activities Subtot  OSWER 5-6: Assume 15% of O&M Activities Subtot
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)	Subto	tal, O&M	Activities	\$27,000 \$4,100 \$4,100	OSWER 5-6: Assume 15% of O&M Activities Subtot
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)  Subtotal, O&M	Subto	tal, O&M	Activities	<b>\$27,000</b> \$4,100	OSWER 5-6: Assume 15% of O&M Activities Subtot
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)  Subtotal, O&M  ofessional/Technical Services	Subto	tal, O&M	Activities	\$27,000 \$4,100 \$4,100 \$35,000	OSWER 5-6: Assume 15% of O&M Activities Subtot OSWER 5-6: Assume 15% of O&M Activities Subtot
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)  Subtotal, O&M  ofessional/Technical Services  Project Management (10% O&M Activities Subtotal w/Contingencies)	Subto	tal, O&M	Activities	\$27,000 \$4,100 \$4,100 \$35,000	OSWER 5-6: Assume 15% of O&M Activities Subtot OSWER 5-6: Assume 15% of O&M Activities Subtot OSWER 5-8: Assume 10% of O&M Activities Subtot including contingencies
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)  Subtotal, O&M  ofessional/Technical Services  Project Management (10% O&M Activities Subtotal	Subto	tal, O&M	Activities	\$27,000 \$4,100 \$4,100 \$35,000	OSWER 5-6: Assume 15% of O&M Activities Subtoto OSWER 5-6: Assume 15% of O&M Activities Subtoto OSWER 5-8: Assume 10% of O&M Activities Subtoto
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)  Subtotal, O&M  ofessional/Technical Services  Project Management (10% O&M Activities Subtotal  w/Contingencies)  Technical Support (15% O&M Activities Subtotal	Subto	with Con	Activities	\$27,000 \$4,100 \$4,100 \$35,000	OSWER 5-6: Assume 15% of O&M Activities Subtool OSWER 5-6: Assume 15% of O&M Activities Subtool OSWER 5-8: Assume 10% of O&M Activities Subtool including contingencies OSWER 5-8: Assume 15% of O&M Activities Subtool

## PERIODIC COSTS

Construction/O&M Activities Every 5 Years O&M Activities

## Maintain Security Fencing (every 5 years)

Fence, chain link industrial, schedule 40, 2"	280	\$36	L.F.		Means 32 31 13.20 0500; Assumes 10% of security
posts @ 10' O.C., set in concrete, 6' H, 3 strands					fence is repaired every five years.
barb wire, 6 ga. wire, galv. steel					
	S	ubtotal, C	Contractor	\$10,000	\$10,080
Subtotal, Maintain Existing So	curity Fe	ence (ever	y 5 years)	\$10,000	\$10,080

M.1 /D 1 . E	- 1	¢505	T C	Ø505	T
Mob./Demob., Equipment & Staff	1	\$525	L.S.	\$525	Environmental Sciences Network North Atlantic
					Invoice dated 09/08/06
ATV/Track-Mtd. Direct Push System, 1-2	1	\$1,495	Day	\$1,495	Environmental Sciences Network North Atlantic
operators, 8-hrs/day			_		Invoice dated 09/08/06
Vapor/Soil Sampling Expendable Pkg (per day)	1	\$200	Day	\$200	Environmental Sciences Network North Atlantic
					Invoice dated 09/08/06
Vapor Implant Installation (includes vapor pt,	1	\$95	Ea.	\$95	Environmental Sciences Network North Atlantic
screen, tubing, glass beads, bentonite seal)					Invoice dated 09/08/06
Travel Costs - DP Services	2	\$150	Ea.	\$300	Environmental Sciences Network North Atlantic
					Invoice dated 09/08/06
		Subtotal (	Contractor	\$2,600	\$2.615

#### TABLE D-2a.2 Detailed Cost Estimate for Alternative SO-2: Limited Action

Revision No.: 01 - DRAFT

Date: October 2007

#### Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

UNIT

SO-2: Limited Action

PTION	OTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer	<b>V11</b>	00010	011115	COSI	COMMINICATION EXERCISE
Labor	10	\$99	Hr	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, field supplies,	1	\$149			Assume 15% of labor cost.
PPE, telephone, etc.)	-	41.7	Zio.	41.7	15/0 51 14051 2050
		Subtotal	, Engineer	\$1,100	\$1,139
Subtotal, Soil Vapor Monitoring Point	Mainten	ance (ever	ry 5 years)	\$3,800	\$3,754
Subtotal, E	very 5 Ye	ears O&M	Activities	\$14,000	
Scope Contingency (15% Every 5 Years O&M Activities Subtotal)				\$2,100	OSWER 5-6: Assume 15% of Periodic Every 5 Year O&M Activities Subtotal
Bid Contingency (15% Every 5 Years O&M Activities				\$2,100	OSWER 5-6: Assume 15% of Every 5 Years O&M
Subtotal)					Activities Subtotal
Subtotal, Every 5 Years O&M	Activities	with Con	tingencies —	\$18,000	
Subtotal, C	Construct	tion/O&M	Activities	\$18,000	
e . 1/m 1 . 1 G .					
fessional/Technical Services				¢1 000	OSWER 5-8: Assume 10% of Construction/O&M
Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)				\$1,800	Activities Subtotal (including contingencies)
Technical Support (15% Construction/O&M Activities				\$2,700	OSWER 5-8: Assume 15% of Construction/O&M
Subtotal w/Contingencies)				\$2,700	Activities Subtotal (including contingencies)
Subtotal w/Contingencies)					
					Treat vittes Bustotta (meruanig contingencies)
Five-Veer Peview					- rear rates buctom (morataing commigeners)
Five-Year Review					. Iva raes success (invitating volume general)
Five-Year Review Engineer Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate
Engineer  Labor	1				
Engineer  Labor  Misc Expenses (e.g., reproduction, telephone,		\$12,400 \$620		\$12,400 \$620	Unit cost assumes 100 labor hours at an average rate \$124/hr. See Note 3.
Engineer  Labor	1	\$620	L.S.	\$620	Unit cost assumes 100 labor hours at an average rate \$124/hr. See Note 3.  Assume 5% of labor costs.
Engineer  Labor  Misc Expenses (e.g., reproduction, telephone,		\$620			Unit cost assumes 100 labor hours at an average rate \$124/hr. See Note 3.
Engineer  Labor  Misc Expenses (e.g., reproduction, telephone,	1	\$620 Subtotal	L.S.	\$620 \$13,000	Unit cost assumes 100 labor hours at an average rate \$124/hr. See Note 3.  Assume 5% of labor costs.  \$13,020
Engineer  Labor  Misc Expenses (e.g., reproduction, telephone,	1	\$620 Subtotal	L.S.	\$620	Unit cost assumes 100 labor hours at an average rate \$124/hr. See Note 3.  Assume 5% of labor costs.
Engineer  Labor  Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1 Subtota	\$620 Subtotal	L.S. , Engineer	\$620 \$13,000 \$13,000	Unit cost assumes 100 labor hours at an average rate \$124/hr. See Note 3.  Assume 5% of labor costs.  \$13,020
Engineer  Labor  Misc Expenses (e.g., reproduction, telephone,	1 Subtota	\$620 Subtotal	L.S. , Engineer	\$620 \$13,000	Unit cost assumes 100 labor hours at an average rate \$124/hr. See Note 3.  Assume 5% of labor costs.  \$13,020

Abbreviations:

 $Ea. = each \hspace{1cm} L.F. = linear \ feet \hspace{1cm} M.S.F. = thousand \ square \ feet$ 

#### Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.

RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.

ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. Laboratory costs for soil vapor sampling assume analysis of 6 (4 primary samples, I duplicate and I ambient air sample) soil vapor samples (VOCs by USEPA Method TO-15, 2-methylnaphthalene by MADEP APH Method). Laboratory unit costs based on 2006 2007 Fee Schedule for Alpha Woods Hole Labs (AWHL) of Raynham, Massachusetts.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

# Appendix D-2b

**Cost Estimates for Alternative SO-3** 

## **Cost Estimate Summary for**

# Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos $\geq 1\%$ Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

## **CAPITAL COSTS**

Construction Activities	
Implementation Plans/Submittals	\$10,000
Soil Vapor Monitoring Point Installation	
Contractor	\$2,900
Engineer	\$1,500
Subtotal, Soil Vapor Monitoring Point Installation	\$4,400
Install Passive Barrier & Sub-Slab Depressurization System	
Contractor	\$45,000
Engineer	\$6,300
Subtotal, Install Passive Barrier & Sub-Slab Depressurization System	\$51,300
Post-Construction Submittals/As-Builts	\$5,000
Subtotal, Construction Activities	\$71,000
Scope Contingency (15% Construction Activities Subtotal)	\$11,000
Bid Contingency (15% Construction Activities Subtotal)	\$11,000
Subtotal, Construction Activities with Contingencies	\$90,000
Professional/Technical Services	
Project Management (10% Construction Activities Subtotal w/Contingencies)	\$9,000
Remedial Design (20% Construction Activities Subtotal w/Contingencies)	\$18,000
Construction Management (15% Construction Activities Subtotal w/Contingencies)	\$14,000
Subtotal, Professional/Technical Services	\$41,000
Institutional Controls	
Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	\$15,000
TOTAL, CAPITAL COSTS	\$150,000

## **Cost Estimate Summary for**

# Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos ≥ 1% **Feasibility Study**

## **Blackburn & Union Privileges Superfund Site** Walpole, Massachusetts

#### **ANNUAL O&M COSTS**

$\Omega RM$	Activities
UNIV	ACHVIIIes

O&M Activities	
Maintain Existing Cap/Cover	
Earthwork Contractor (Assume 1 visit annually)	
Mobilization/Demobilization	\$690
Pavement Restoration	\$140
Subtotal, Earthwork Contractor	\$830
Engineer	\$7,400
Subtotal, Maintain Existing Cap/Cover	\$8,200
Subtotal, O&M Activities Costs	\$8,200
Scope Contingency (15% O&M Activities Subtotal)	\$1,200
Bid Contingency (15% O&M Activities Subtotal)	\$1,200
Subtotal, O&M Activities with Contingencies	\$11,000
Professional/Technical Services	
Project Management (10% Periodic Construction/O&M Activities Subtotal	
w/Contingencies)	\$1,100
Technical Support (15% Periodic Construction/O&M Activities Subtotal w/Contingencies	\$1,650

TOTAL, ANNUAL O&M COSTS

Subtotal, Professional/Technical Services

\$14,000

\$2,800

## **Cost Estimate Summary for**

# Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos $\geq 1\%$ **Feasibility Study**

## **Blackburn & Union Privileges Superfund Site** Walpole, Massachusetts

## PERIODIC COSTS

PERIODIC COSTS	
Construction/O&M Activities	
Years 1 through 10 O&M Activities	
Soil Vapor Monitoring (years 1 through 10 only)	
Engineer	\$4,000
Laboratory	\$1,700
Subtotal, Soil Vapor Monitoring (years 1 through 10 only)	\$5,700
Indoor Air Monitoring & System Operation (years 1 through 10 only)	
Indoor Air Monitoring Costs	ΦΦ 000
Engineer	\$2,800
Laboratory	\$1,100
Subtotal, Indoor Air Monitoring	\$4,000
System Operating Costs	***
Utilities	\$250
Subtotal, System Operating Costs	\$250
Subtotal, Indoor Air Monitoring & System Operation (years 1 through 10 only)	\$4,200
Subtotal, Years 1 through 10 O&M Activities	\$9,900
Scope Contingency (15% Years 1 through 10 O&M Activities Subtotal)	\$1,500
Bid Contingency (15% Years 1 through 10 O&M Activities Subtotal)	\$1,500
Subtotal, Years 1 through 10 O&M Activities with Contingencies	\$13,000
Years 5 and 10 O&M Activities	
Soil Vapor Monitoring Point Maintenance (years 5 and 10 only)	
Contractor	\$2,600
Engineer	\$1,100
Subtotal, Soil Vapor Monitoring Point Maintenance (years 5 and 10 only)	\$3,800
Sub-Slab Depressurization System Maintenance (years 5 and 10 only)	
Contractor	\$860
Subtotal, Sub-Slab Depressurization System Maintenance (years 5 and 10 only)	\$860
Subtotal, Years 5 and 10 O&M Activities	\$4,700
Scope Contingency (15% Years 5 and 10 O&M Activities Subtotal)	\$700
Bid Contingency (15% Years 5 and 10 O&M Activities Subtotal)	\$710
Subtotal, Years 5 and 10 O&M Activities with Contingencies	\$6,100
Subtotal, Periodic O&M Activities with Contingencies	\$19,000
Professional/Technical Services	
Project Management (10% Periodic O&M Activities Subtotal w/Contingencies)	\$1,900
Technical Support (15% Periodic O&M Activities Subtotal w/Contingencies)	\$2,900
Five-Year Review	\$13,000
Subtotal, Professional/Technical Services	\$18,000
TOTAL, PERIODIC COSTS	\$37,000

#### **Cost Estimate Summary for**

# Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos $\geq 1\%$ Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	<u>Total Cost</u>	Total Cost Per Year	<u>Discount</u> <u>Factor</u>	Present Value
Capital Costs	0	\$150,000	\$150,000	1	\$150,000
Annual O&M Costs	1-100	\$1,400,000	\$14,000	14.3	\$200,000
Periodic Costs	1	\$16,000	\$16,000	0.935	\$15,000
Periodic Costs	2	\$16,000	\$16,000	0.873	\$14,000
Periodic Costs	3	\$16,000	\$16,000	0.816	\$13,000
Periodic Costs	4	\$16,000	\$16,000	0.763	\$12,000
Periodic Costs	5	\$37,000	\$37,000	0.713	\$26,000
Periodic Costs	6	\$16,000	\$16,000	0.666	\$11,000
Periodic Costs	7	\$16,000	\$16,000	0.623	\$10,000
Periodic Costs	8	\$16,000	\$16,000	0.582	\$9,000
Periodic Costs	9	\$16,000	\$16,000	0.544	\$9,000
Periodic Costs	10	\$37,000	\$37,000	0.508	\$19,000
Periodic Costs	15	\$13,000	\$13,000	0.362	\$5,000
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$900
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$600
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$400
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$80
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$60
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$40
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

#### TOTAL PRESENT VALUE OF ALTERNATIVE

\$500,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

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**Detailed Cost Estimate for** 

Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos  $\geq 1\%$ Feasibility Study

# Blackburn & Union Privileges Superfund Site Walnole Massachusetts

	Walp	ole, Massa	achusetts		
apor Instrusion Mitigation and Capping of Soil with Asbe	stos ≥ 1%				
IPTION	OTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
AL COSTS	Ų.,	00515	011110	0001	O ONICIDIA (TS) ALLI LIALI. (OL
onstruction Activities					
Implementation Plans/Submittals	1	\$10,000	Ea.	\$10,000	SHA Estimate
Soil Vapor Monitoring Point Installation					
Contractor					
Mob./Demob., Equipment & Staff	1	\$525	L.S.	\$525	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
ATV/Track-Mtd. Direct Push System, 1-2 operators, 8-hrs/day	1	\$1,495	Day	\$1,495	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor/Soil Sampling Expendable Pkg (per day)	1	\$200	Day	\$200	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor Implant Installation (includes vapor pt, screen, tubing, glass beads, bentonite seal)	4	\$95	Ea.	\$380	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Travel Costs - DP Services	2	\$150	Ea.	\$300	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
		Subtotal, (	Contractor =	\$2,900	\$2,900
Engineer					
Engineer  Labor	13	\$99	Ur	\$1.287	See Note 3.
Misc. Field Expenses (e.g. mileage, field supplies,	13	\$194			Assume 15% of labor cost.
PPE, telephone, etc.)		G 1	_	Φ1. <b>700</b>	01.401
		Subtotal	, Engineer	\$1,500	\$1,481
Contractor					l
Passive Barrier, new construction	5,000	\$4.00			ITRC, 2007.
Sub-slab Depressurization System	5,000	\$5.00			ITRC, 2007.
	•	Subtotal, v	Contractor	\$45,000	\$45,000
Engineer					
Labor, Oversight	55	\$99	Hr.	\$5,445	Assumes 1 week of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$817	L.S.	\$817	Assume 15% of labor cost
		Subtotal	, Engineer	\$6,300	\$6,262
Subtotal, Install Passive Barrier & Sub-	CL L D				
Post-Construction Submittals/As-Builts	Siab Depi	ressurizati	on System	\$51,300	\$51,262
C	Slab Depr 1		·		\$51,262 SHA Estimate
Su	1	\$5,000	·		
Su	1	\$5,000	Ea.	\$5,000 \$71,000	SHA Estimate
Scope Contingency (15% Construction Activities Subtotal)	1	\$5,000	Ea.	\$5,000 \$71,000 \$11,000	SHA Estimate  OSWER 5-6: Assume 15% of Construction Activ Subtotal
Scope Contingency (15% Construction Activities	1	\$5,000	Ea.	\$5,000 \$71,000 \$11,000	OSWER 5-6: Assume 15% of Construction Activ Subtotal OSWER 5-6: Assume 15% of Construction Activ
Scope Contingency (15% Construction Activities Subtotal)	1 lbtotal, Co	\$5,000	Ea.  Activities	\$5,000 \$71,000 \$11,000	SHA Estimate  OSWER 5-6: Assume 15% of Construction Activ Subtotal
Scope Contingency (15% Construction Activities Subtotal) Bid Contingency (15% Construction Activities Subtotal) Subtotal, Construction	1 lbtotal, Co	\$5,000	Ea.  Activities	\$5,000 \$71,000 \$11,000	OSWER 5-6: Assume 15% of Construction Activ Subtotal OSWER 5-6: Assume 15% of Construction Activ
Scope Contingency (15% Construction Activities Subtotal) Bid Contingency (15% Construction Activities Subtotal) Subtotal, Construction ofessional/Technical Services	1 lbtotal, Co	\$5,000	Ea.  Activities	\$5,000 \$71,000 \$11,000 \$11,000	OSWER 5-6: Assume 15% of Construction Activ Subtotal OSWER 5-6: Assume 15% of Construction Activ Subtotal
Scope Contingency (15% Construction Activities Subtotal) Bid Contingency (15% Construction Activities Subtotal) Subtotal, Construction rofessional/Technical Services Project Management (10% Construction Activities	1 lbtotal, Co	\$5,000	Ea.  Activities	\$5,000 \$71,000 \$11,000 \$11,000	OSWER 5-6: Assume 15% of Construction Activ Subtotal OSWER 5-6: Assume 15% of Construction Activ Subtotal OSWER 5-8: Assume 10% of Construction Activ
Scope Contingency (15% Construction Activities Subtotal) Bid Contingency (15% Construction Activities Subtotal) Subtotal, Construction ofessional/Technical Services	1 lbtotal, Co	\$5,000	Ea.  Activities	\$5,000 \$71,000 \$11,000 \$11,000 \$90,000	OSWER 5-6: Assume 15% of Construction Activisable Subtotal OSWER 5-6: Assume 15% of Construction Activisable Subtotal

Subtotal, Professional/Technical Services

Subtotal including contingencies \$14,000 OSWER 5-8: Assume 15% of Construction Activities

Subtotal including contingencies

w/Contingencies)

Construction Management (15% Construction Activities Subtotal w/Contingencies)

**Detailed Cost Estimate for** 

Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos ≥ 1% Feasibility Study

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos ≥ 1%

UNIT

QTY COSTS UNITS COST COMMENTS/REFERENCE

**Institutional Controls** 

DESCRIPTION

**Establish Deed Restrictions** 

**		
En	oin	PPI
	~…	···

Establish Institutional Controls in the form of Deed	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of
Restrictions					properties requiring deed restrictions.
		C-1.4.4.1	E	¢15,000	¢15 000

Subtotal, Engineer \$15,000 \$15,000

**Subtotal, Establish Deed Restrictions** 

\$15,000 \$15,000 Revision No.: 01 - DRAFT

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**Subtotal, Institutional Controls** \$15,000

TOTAL, CAPITAL COSTS \$150,000

ANNUAL O&M COSTS

**O&M** Activities

Maintain Existing Cap/Cover

Earthwork Contractor (Assume 1 visit annually)

Crew, 100 miles, per person	2	\$192			ECHOS 33 01 0204
Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; assumes 50 miles per
					mob/demob
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
Subtotal, N	Mobiliza	tion/Dem	obilization	\$690	\$688
Pavement Restoration					
Pavement removal, Bituminous driveways	3	\$5.71	S.Y.	\$18	Means 02 41 13.17 5100
Transportation & Disposal, Asphalt	1	\$25	Ton	\$25	SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	27	\$2.93	S.F.	\$80	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	1	\$14	L.C.Y	\$14	Means 31 23 23.18 1255
Sub	total, Pa	vement R	estoration	\$140	\$137
Subt	otal, Ea	rthwork (	Contractor	\$830	\$825
Engineer					
Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$594	L.S.	\$594	Assume 15% of field labor cost.
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies,	1	\$137		. ,	Assume 5% of report preparation labor cost.
telephone/fax, postage, etc.)		0.1	_	Φ7. 400	¢7.410
		Subtotal	, Engineer	\$7,400	\$7,419
Subtotal, M	[aintain]	Existing (	Cap/Cover	\$8,200	\$8,244
Sub	total, O	&M Activ	ities Costs	\$8,200	
Scope Contingency (15% O&M Activities Subtotal)				\$1,200	OSWER 5-6: Assume 15% of O&M Activities Subtotal
			1		Subtotal
Bid Contingency (15% O&M Activities Subtotal)				\$1,200	OSWER 5-6: Assume 15% of O&M Activities Subtotal

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Date: October 2007

**Detailed Cost Estimate for** 

Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos  $\geq 1\%$ Feasibility Study

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos ≥ 1%

		UNIT			
DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% Periodic Construction/O	& <i>M</i>			\$1,100	OSWER 5-8: Assume 10% of O&M Activities
Activities Subtotal w/Contingencies)					Subtotal including contingencies
Technical Support (15% Periodic Construction/O&)	M			\$1,650	OSWER 5-8: Assume 15% of O&M Activities
Activities Subtotal w/Contingencies)					Subtotal including contingencies
Subtot	al, Professiona	al/Technica	l Services	\$2,800	-

#### PERIOD

Cor

ictivities Subtotut w/Contingencies)			al Services	£2 900	· · · · · · · · · · · · · · · · · · ·
Subtotal, Pro	ofessional	l/Technica		\$2,800	
тот	AL, ANN	UAL O&	M COSTS	\$14,000	
COSTS ruction/O&M Activities Years 1 through 10 O&M Activities					
Soil Vapor Monitoring (years 1 through 10 only)					
Engineer					
Labor, Soil Vapor Sampling	10	\$99	Hr	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149			Assume 15% of labor cost.
Labor, Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$136	L.S.	\$136	Assume 5% of labor cost.
, , , , , , , , , , , , , , , , , , ,		Subtotal	, Engineer	\$4,000	\$4,003
Laboratory  Chaminal and aris NOC (Mathed TO 15)		0005	г.	¢1.710	2007 2007 F., Cal. 141, 411, W. 1 W. 1
Chemical analysis, VOCs (Method TO-15)	6	\$285	Ea.	\$1,710	2006-2007 Fee Schedule, Alpha Woods Hole Lab Includes equipment rental.
					includes equipment tental.
	Sı	uhtotal I	aboratory	\$1.700	\$1.710
	Sı	ubtotal, L	aboratory	\$1,700	\$1,710
Subtotal, Soil Vapor Monitor	ing (years	s 1 throug	·	\$1,700 <b>\$5,700</b>	\$1,710 \$5,713
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs	ing (years	s 1 throug	·		. ,
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer	ing (years	s 1 throug	gh 10 only)	\$5,700	\$5,713
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer Labor, Indoor Air Sampling	ing (years	s 1 throug	th 10 only)	<b>\$5,700</b>	
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer	ing (years rough 10 o	s 1 throug only) \$99	th 10 only)	<b>\$5,700</b>	\$5,713 See Note 3.
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	ing (years rough 10 o	s 1 throug only) \$99	Hr. L.S.	\$5,700 \$990 \$149	\$5,713 See Note 3.
Indoor Air Monitoring & System Operation (years 1 thrushold the Indoor Air Monitoring Costs  Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	ough 10 o	\$1 througonly)  \$99 \$149	Hr. L.S.	\$5,700 \$990 \$149	\$5,713  See Note 3. Assume 15% of labor cost.
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies,	ough 10 o	\$1 throughout)  \$99 \$149  \$124 \$81	Hr. L.S. Hr.	\$5,700 \$990 \$149	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3.
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	ough 10 o	\$1 throughout)  \$99 \$149  \$124 \$81	Hr. L.S. Hr. L.S.	\$5,700 \$990 \$149 \$1,612 \$81	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Laboratory	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	\$ 1 through through the state of the state o	Hr. L.S. Hr. L.S.	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	ough 10 o	\$1 throughout)  \$99 \$149  \$124 \$81	Hr. L.S. Hr. L.S.	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832  2006-2007 Fee Schedule, Alpha Woods Hole Lab
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Laboratory	10 13 1 1 4	\$ 1 through through the state of the state o	Hr. L.S. Hr. L.S. Fingineer	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832  2006-2007 Fee Schedule, Alpha Woods Hole Lab Includes equipment rental.
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Laboratory  Chemical analysis, VOCs (Method TO-15)	10 13 1 1 St	\$1 through through the state of	Hr. L.S. Hr. L.S. , Engineer	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800 \$1,140	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832  2006-2007 Fee Schedule, Alpha Woods Hole Lab Includes equipment rental. \$1,140
Indoor Air Monitoring & System Operation (years 1 thr Indoor Air Monitoring Costs Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Laboratory  Chemical analysis, VOCs (Method TO-15)	10 13 1 1 St	\$1 through through the state of	Hr. L.S. Hr. L.S. Fingineer	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832  2006-2007 Fee Schedule, Alpha Woods Hole Lab Includes equipment rental.
Indoor Air Monitoring & System Operation (years 1 throndoor Air Monitoring Costs  Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Laboratory  Chemical analysis, VOCs (Method TO-15)  Sub	10 13 1 1 St	\$1 through through the state of	Hr. L.S. Hr. L.S. , Engineer  Ea.  aboratory  Monitoring	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800 \$1,140 \$4,000	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832  2006-2007 Fee Schedule, Alpha Woods Hole Lab Includes equipment rental. \$1,140
Indoor Air Monitoring & System Operation (years 1 throndoor Air Monitoring Costs  Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Laboratory  Chemical analysis, VOCs (Method TO-15)  Sub  System Operating Costs  Utilities	10 1 13 1 1 Soutotal, Ind	\$1 througonly)  \$99 \$149  \$124 \$81  Subtotal  \$285  ubtotal, I loor Air M	Hr. L.S. Hr. L.S. , Engineer  Ea.  aboratory  Monitoring	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800 \$1,140 \$4,000	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832  2006-2007 Fee Schedule, Alpha Woods Hole Lab Includes equipment rental.  \$1,140 \$3,972  SHAestimate. Assumes in-line centrigual blower
Indoor Air Monitoring & System Operation (years 1 throndoor Air Monitoring Costs  Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Laboratory  Chemical analysis, VOCs (Method TO-15)  Sub  System Operating Costs  Utilities  Blower Electricity	10 1 13 1 Soutotal, Ind	\$1 througonly)  \$99 \$149  \$124 \$81  Subtotal  \$285  ubtotal, I. loor Air M	Hr. L.S. Hr. L.S. , Engineer  Ea.  aboratory Monitoring	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800 \$1,140 \$4,000	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832  2006-2007 Fee Schedule, Alpha Woods Hole Lab Includes equipment rental.  \$1,140 \$3,972  SHAestimate. Assumes in-line centrigual blower single-phase, 1/4 Hp
Indoor Air Monitoring & System Operation (years 1 throndoor Air Monitoring Costs  Engineer  Labor, Indoor Air Sampling  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Laboratory  Chemical analysis, VOCs (Method TO-15)  Sub  System Operating Costs  Utilities  Blower Electricity	10 1 13 1 Soutotal, Ind	\$1 througonly)  \$99 \$149  \$124 \$81  Subtotal  \$285  ubtotal, I. loor Air M	Hr. L.S. Hr. L.S. , Engineer  Ea.  aboratory Monitoring  Year  al, Utilities	\$5,700 \$990 \$149 \$1,612 \$81 \$2,800 \$1,140 \$4,000 \$250	\$5,713  See Note 3. Assume 15% of labor cost.  See Note 3. Assume 5% of labor cost.  \$2,832  2006-2007 Fee Schedule, Alpha Woods Hole Lat Includes equipment rental.  \$1,140 \$3,972  SHAestimate. Assumes in-line centrigual blower single-phase, 1/4 Hp \$250

Revision No.: 01 - DRAFT

Date: October 2007

**Detailed Cost Estimate for** 

Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos  $\geq 1\%$ Feasibility Study

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-3: Vapor	Instrusion Mitiga	ation and Ca	pping of Soil	with Asbestos	≥1%

PTION	OTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Subtotal, Years	•			\$9,900	COMMENTS/REFERENCE
Subtomi, Temp	1 till ough			45,500	
Scope Contingency (15% Years 1 through 10 O&M Activities Subtotal)				\$1,500	OSWER 5-6: Assume 15% of Years 1 through 10 O&M Activities Subtotal
Bid Contingency (15% Years 1 through 10 O&M Activities Subtotal)				\$1,500	OSWER 5-6: Assume 15% of Years 1 through 10 O&M Activities Subtotal
Subtotal, Years 1 through 10 O&M	Activities	with Con	tingencies	\$13,000	ocan ricaviaco pactolar
Years 5 and 10 O&M Activities					
Soil Vapor Monitoring Point Maintenance (years 5 and	10 only)				
	• /				
Contractor	1	<b>\$505</b>	T C	<b>\$505</b>	Paris and 1 Griss and Notes In North Address.
Mob./Demob., Equipment & Staff	1	\$525	L.S.	\$323	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
ATV/Track-Mtd. Direct Push System, 1-2	1	\$1,495	Day	\$1,495	Environmental Sciences Network North Atlantic
operators, 8-hrs/day	1	¢200	Davi	<b>#200</b>	Invoice dated 09/08/06
Vapor/Soil Sampling Expendable Pkg (per day)	1	\$200	Day	\$200	Environmental Sciences Network North Atlantic Invoice dated 09/08/06
Vapor Implant Installation (includes vapor pt,	1	\$95	Ea.	\$95	Environmental Sciences Network North Atlantic
screen, tubing, glass beads, bentonite seal)  Travel Costs - DP Services	2	\$150	Eo	\$200	Invoice dated 09/08/06 Environmental Sciences Network North Atlantic
Haver Costs - Dr Services	2	\$130	Ea.	\$300	Invoice dated 09/08/06
	S	Subtotal, (	= Contractor	\$2,600	\$2,615
		ŕ			
Engineer	10	400		4000	
Labor	10	\$99			See Note 3.
Misc. Field Expenses (e.g. mileage, field supplies, PPE, telephone, etc.)	1	\$149	L.S.		Assume 15% of labor cost.
		Subtotal	, Engineer	\$1,100	\$1,139
Subtatal Sail Vanan Manitaning Daint Main	40	5	d 10 cmls.)		\$3,754
Subtotal, Soil Vapor Monitoring Point Main	tenance (y	ears 5 and			
			a roomy )	\$3,800	φ3,73 <del>4</del>
Sub-Slab Depressurization System Maintenance (years	5 and 10 c	only)	u 10 omy )	\$3,800	Ф.Э., Г.Э <del>Т</del>
Sub-Slab Depressurization System Maintenance (years	5 and 10 c	only)	a to only )	\$3,800	φ3,73 <del>4</del>
Sub-Slab Depressurization System Maintenance (years  Contractor	5 and 10 (	only)	a 10 only )	\$3,800	<i>\$3,734</i>
Contractor  Replacement Blower, in-line centrigual, single-	5 and 10 o	s555	• ,	,	Grainger Industrial Supply, 2007.
Contractor  Replacement Blower, in-line centrigual, single-phase, 1/4 Hp	1	\$555	Ea.	\$555	Grainger Industrial Supply, 2007.
Contractor  Replacement Blower, in-line centrigual, single-	1 4	\$555 \$75	Ea.	\$555 \$300	Grainger Industrial Supply, 2007. SHA estimate.
Contractor  Replacement Blower, in-line centrigual, single-phase, 1/4 Hp	1 4	\$555 \$75	Ea.	\$555	Grainger Industrial Supply, 2007.
Contractor  Replacement Blower, in-line centrigual, single-phase, 1/4 Hp  Labor	1 4 S	\$555 \$75 Subtotal, (	Ea.  Hr.  Contractor	\$555 \$300	Grainger Industrial Supply, 2007. SHA estimate.
Contractor  Replacement Blower, in-line centrigual, single-phase, 1/4 Hp	1 4 S	\$555 \$75 Subtotal, (	Ea.  Hr.  Contractor	\$555 \$300 \$860	Grainger Industrial Supply, 2007.  SHA estimate.  \$855
Contractor  Replacement Blower, in-line centrigual, single-phase, 1/4 Hp  Labor	1 4 Soutenance (y	\$555 \$75 Subtotal, (	Ea.  Hr.  Contractor  d 10 only)	\$555 \$300 \$860	Grainger Industrial Supply, 2007.  SHA estimate. \$855
Contractor  Replacement Blower, in-line centrigual, single- phase, 1/4 Hp Labor  Subtotal, Sub-Slab Depressurization System Main	1 4 Soutenance (y	\$555 \$75 Subtotal, (	Ea.  Hr.  Contractor  d 10 only)	\$555 \$300 \$860 \$860 \$4,700	Grainger Industrial Supply, 2007.  SHA estimate. \$855
Contractor  Replacement Blower, in-line centrigual, single- phase, 1/4 Hp  Labor  Subtotal, Sub-Slab Depressurization System Main  Subtotal, Y	1 4 Soutenance (y	\$555 \$75 Subtotal, (	Ea.  Hr.  Contractor  d 10 only)	\$555 \$300 \$860 \$860 \$4,700	Grainger Industrial Supply, 2007.  SHA estimate. \$855 \$855
Contractor  Replacement Blower, in-line centrigual, single- phase, 1/4 Hp Labor  Subtotal, Sub-Slab Depressurization System Main Subtotal, Y  Scope Contingency (15% Years 5 and 10 O&M	1 4 Soutenance (y	\$555 \$75 Subtotal, (	Ea.  Hr.  Contractor  d 10 only)	\$555 \$300 \$860 \$860 \$4,700	Grainger Industrial Supply, 2007.  SHA estimate. \$855 \$855  \$855  OSWER 5-6: Assume 15% of Years 5 and 10 O&I

Subtotal, Periodic O&M Activities with Contingencies

\$19,000

Revision No.: 01 - DRAFT

Date: October 2007

**Detailed Cost Estimate for** 

#### Alternative SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos ≥ 1% **Feasibility Study**

#### **Blackburn & Union Privileges Superfund Site** Walpole, Massachusetts

SO-3: Vapor Instrusion Mitigation and Capping of Soil with Asbestos  $\geq 1\%$ 

		UNIT			
DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% Periodic O&M Activities				\$1,900	OSWER 5-8: Assume 10% of Periodic O&M
Subtotal w/Contingencies)					Activities Subtotal including contingencies
Technical Support (15% Periodic O&M Activities				\$2,900	OSWER 5-8: Assume 15% of Periodic O&M
Subtotal w/Contingencies)					Activities Subtotal including contingencies
Five-Year Review					
Engineer		¢12 400	T C	¢12.400	10011 1
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone,		\$620	L.S.	\$620	
postage, etc.)	1				Assume 5% of labor costs.
		Subtotal	, Engineer	\$13,000	\$13,020
	Subtot	al, Five-Ye	ear Review	\$13,000	
Subtotal, F	Professiona	al/Technic	al Services	\$18,000	
	TOTAL,	, PERIOD	IC COSTS	\$37,000	

Abbreviations:

B.C.Y. = bank cubic yards  $L.S. = lump \ sump$ S.F. = square feetC.Y. = cubic yardsL.C.Y. = loose cubic yards Mo. = month S.Y. = square yard

Ea.=each $L.F. = linear \ feet$  $M.S.F. = thousand \ square \ feet$ 

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.

RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.

ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. Laboratory costs for soil vapor sampling assume analysis of 6 (4 primary samples, 1 duplicate and 1 ambient air sample) soil vapor samples (VOCs by USEPA Method TO-15, 2-methylnaphthalene by MADEP APH Method). Laboratory unit costs based on 2006 2007 Fee Schedule for Alpha Woods Hole Labs (AWHL) of Raynham, Massachusetts.
- 6. ITRC (Interstate Technology & Regulatory Council). 2007. Vapor Intrusion Pathway: A Practical Guideline. VI-1. Washington, D.C.: Interstate Technology & Regulatory Council, Vapor Intrusion Team. www.itrcweb.org.
- 7. Laboratory costs for indoor air sampling assume analysis of 4 (2 primary samples, 1 duplicate, and 1 ambient air sample) soil vapor samples (VOCs by USEPA Method TO-15, 2-methylnaphthalene by MADEP APH Method). Laboratory unit costs based on 2006 - 2007 Fee Schedule for Alpha Woods Hole Labs (AWHL) of Raynham, Massachusetts.
- 8. Grainger Industrial Supply, 2007. On-line catalog available at http://www.grainger.com/Grainger/wwg/start.shtml.
- 9. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 10. All subtotals and total are rounded to 2 significant numbers. The number presented italics to the right of rounded subtotals is the unrounded summed value.

# Appendix D-2c

**Cost Estimates for Alternative SO-4** 

Note that this appendix includes costs which have been updated using those originally presented in the Draft FS (SHA, 2007) for alternative SO-4. An error in the original contingency costs was corrected.

# Cost Estimate Summary for Alternative SO-4: Limited Excavation

# **Feasibility Study**

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

## **CAPITAL COSTS**

Construction Activities	
Implementation Plans/Submittals	\$10,000
Limited Excavation	
Contractor	<b>44000</b>
Mobilization/Demobilization	\$4,900
Site Preparation	\$2,000
Excavation	\$14,000
Backfill	\$16,000
Site Restoration	\$7,000
Soil Stabilization	\$4,500
Transportation/Disposal	\$41,000
Subtotal, Contractor	\$89,000
Engineer	\$6,300
Laboratory	\$4,100
Subtotal, Limited Excavation	\$100,000
Post-Construction Submittals/As-Builts	\$5,000
Subtotal, Construction Activities	\$115,000
Scope Contingency (15% Construction Activities Subtotal)	\$17,000
Bid Contingency (15% Construction Activities Subtotal)	\$17,000
Subtotal, Construction Activities with Contingencies	\$150,000
Professional/Technical Services	
Project Management (8% Construction Activities Subtotal w/Contingencies)	\$12,000
Remedial Design (15% Construction Activities Subtotal w/Contingencies)	\$23,000
Construction Management (10% Construction Activities Subtotal w/Contingencies)	\$15,000
Subtotal, Professional/Technical Services	\$50,000
Institutional Controls	
Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	\$15,000
OTAL, CAPITAL COSTS	\$220,000
, <del>-</del>	\$223,000

## Cost Estimate Summary for Alternative SO-4: Limited Excavation Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

## PERIODIC COSTS

**Professional/Technical Services** 

Five-Year Review \$13,000
Subtotal, Professional/Technical Services \$13,000

TOTAL, PERIODIC COSTS

\$13,000

#### PRESENT VALUE ANALYSIS

			Total Cost	<b>Discount</b>	
Type of Cost	<u>Year</u>	Total Cost	Per Year	<b>Factor</b>	Present Value
Capital Costs	0	\$220,000	\$220,000	1	\$20,000
Annual O&M Costs	1-100	\$0	\$0	14.3	\$0
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,000
Periodic Costs	10	\$13,000	\$13,000	0.508	\$7,000
Periodic Costs	15	\$13,000	\$13,000	0.362	\$5,000
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$900
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$600
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$400
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$80
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$60
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$40
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

#### TOTAL PRESENT VALUE OF ALTERNATIVE

\$250,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

# TABLE D-2c.2 Detailed Cost Estimate for Alternative SO-4: Limited Excavation Feasibility Study lackburn & Union Privileges Superfund

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**SO-4: Limited Excavation** 

SO-4: Limit	ed Excavation					
DESCRIPT	ION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL C	COSTS					
Consti	ruction Activities					
I	Implementation Plans/Submittals	1	\$10,000	Ea.	\$10,000	SHA estimate
I	Limited Excavation					
(	Contractor					
	Mobilization/Demobilization					
_	Mob/Demob, Loader, Compactor, 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
	Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
	Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
_	Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
_	Decontaminate Medium Equipment	4	\$399			ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
_	Subtotal	Mobiliza	ation/Dem	 lobilization	\$4,900	\$4,898
	Subtomi		ition/Deni	ioomzation	ψ.,,,σο	ψ1,020
	Site Preparation					
	Pavement removal, Bituminous driveways	234	\$6	S.Y.	\$1,336	Means 02 41 13.17 5100
	Erosion Control, Silt Fences, Vinyl, 3' high with 7.5'	150	\$4.28	L.F.	\$642	ECHOS 18 05 0206
		Subto	tal, Site P	reparation	\$2,000	\$1,978
_	Excavation	2.1	0015		<b>\$7.150</b>	T G 1 7 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Crawler-mounted, 1.25 C.Y. 225 Hydraulic	24	\$215	Hr.	\$5,160	ECHOS 17 03 0231; Assumes H&S level D.
_	Excavator 926, 2.0 CY, Wheel Loader	24	\$144	U.	\$2.456	ECHOS 17 03 0222; Assumes H&S level D.
_	Bobcat	24	\$126			ECHOS 17 03 0222, Assumes H&S level D. ECHOS Crew Code COBBC; Assumes H&S level D.
_	Water Truck	24	\$103		· · · · · · · · · · · · · · · · · · ·	ECHOS Crew Code COKBM (Modified); Assumes
	Water Frank	2-1	Ψ103	111.	Ψ2, 472	H&S level D.
_	Sprayed Water Dust Suppressant	2,100	\$0.05	SE	\$105	ECHOS 33 08 0585; Assumes H&S level D.
_	Sprayed Water Bust Suppressum			Excavation		\$14,217
			,		4 - 1,000	+, <del>-</del>
	Backfill					
	Crawler-mounted, 1.25 C.Y. 225 Hydraulic	16	\$199	Hr.	\$3,184	ECHOS 17 03 0231
	Excavator					
	926, 2.0 CY, Wheel Loader	16	\$130	Hr.	\$2,080	ECHOS 17 03 0222
	Vibratory Sheepsfoot Roller, 13 Ton, 66" Wide	16	\$344	Hr.	\$5,504	ECHOS Crew Code COFCQ (Modified)
_	Unclassified Fill, Delivered, Off-site	402	\$12	C.Y.	\$4.824	ECHOS 02222 1001
_	Unclassified Fill, Delivered, Off-site	402		al, Backfill		ECHOS 02223 1001 \$15,592
			Subtot	ai, dackiiii	\$10,000	\$13,392
	Site Restoration					
_	Asphaltic Concrete Pavement, Lots & Driveways,	2,100	\$2.93	S.F.	\$6,153	Means 32 12 16.14 0020
	6" stone base, 2" binder course, 1" topping	,			,	
	Hauling, 20 C.Y. dump truck, 20 mile round trip	59	\$14	L.C.Y	\$826	Means 31 23 23.18 1255
		Subto	otal, Site F	Restoration	\$7,000	\$6,979
_	Soil Stabilization					T
	In-Situ Cement Stabilization, 6%	140	\$32	B.C.Y.	\$4,480	ECHOS 17 03 0602; Assumes one-third of TCE-
						impacted soil & one-half of the asbestos-impacted soil
						will require stabilization; Assumes H&S level D.
_		Subto	tal Sail S4	tabilization	\$4,500	\$4,480
		Subto	tai, son st	tabilization	\$4,500	\$4,460
	Transportation/Disposal					
-	Asphalt	30	\$25	Ton	\$750	SHA discussions with Waste Management, Inc.
_	VOC-Impacted Soils	612		Ton		SHA discussions with ESMI; Includes soil
	•		•			stabilization additive.
	Asbestos-Impacted Soils, Non-Hazardous	93	\$80	Ton	\$7,440	SHA discussions with Waste Management, Inc.;
						Includes soil stabilization additive.

Subtotal, Contractor

Subtotal, Transportation/Disposal

\$41,000 \$41,238

\$89,000 \$89,382

# TABLE D-2c,2 Detailed Cost Estimate for Alternative SO-4: Limited Excavation Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### **SO-4: Limited Excavation**

: Limited Excavation  CRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	55	\$99	Hr.	\$5,445	Assumes 1 week of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$817	L.S.	\$817	Assumes 15% of labor cost
		Subtota	l, Engineer	\$6,300	\$6,262
Laboratory					
Chemical analysis, Soil Management Assessment Package I	3	\$965	Ea.	\$2,895	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, TCE Confirmatory	5	\$185	Ea.	\$925	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	5	\$50	Ea.	\$250	SHA discussions with EMSL Analytical, Inc.
	S	Subtotal, l	Laboratory	\$4,100	\$4,070
	Subtotal	, Limited	Excavation	\$100,000	\$99,714
Post-Construction Submittals/As-Builts	1	\$5,000	Ea.	\$5,000	SHA estimate
Su	btotal, Co	onstructio	n Activities	\$115,000	
Scope Contingency (15% Construction Activities Subtotal)				\$17,000	OSWER 5-6: Assume 15% of O&M Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$17,000	OSWER 5-6: Assume 15% of O&M Activities
Subtotal, Construction			ļ <u>.</u>	\$150,000	Subtotal
Professional/Technical Services Project Management (8% Construction Activities			<b></b>		OSWER 5-8: Assume 8% of Construction Activities
Subtotal w/Contingencies)				, ,	Subtotal including contingencies
Remedial Design (15% Construction Activities Subtotal				\$23,000	OSWER 5-8: Assume 15% of Construction Activity
w/Contingencies)				,	Subtotal including contingencies
Construction Management (10% Construction Activities				\$15,000	OSWER 5-8: Assume 10% of Construction Activit
Subtotal w/Contingencies)				,	Subtotal including contingencies
Subtotal, P	rofessiona	al/Technic	al Services	\$ 50,000	
Institutional Controls Establish Deed Restrictions					
Engineer					
Establish Institutional Controls in the form of Deed Restrictions	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number o properties requiring deed restrictions.
		Subtota	l, Engineer	\$15,000	\$15,000
Subtot	al, Establi		Restrictions	\$15,000	\$15,000
			al Controls	\$15,000	
~			15		1
	TOTAL	., CAPITA	AL COSTS	\$220,000	<u> </u>

#### **Detailed Cost Estimate for Alternative SO-4: Limited Excavation**

#### Feasibility Study Blackburn & Union Privileges Superfund Site

Walpole, Massachusetts

**SO-4: Limited Excavation** 

DESCRIPTION PERIODIC COSTS

UNIT COSTS UNITS

COST COMMENTS/REFERENCE

Professional/Technical Services

**Five-Year Review** 

Engineer					
Labor	1	\$12,400	L.S.		Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
- M. F. ( 1 c (1 1	1	e.c20	T C		•
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
		Subtotal	, Engineer	\$13,000	\$13,020

\$13,000 \$13,020 Subtotal, Five-Year Review

Subtotal, Professional/Technical Services \$13,000

TOTAL, PERIODIC COSTS

\$13,000

Abbreviations:

B.C.Y. = bank cubic yards Hr.=hour $L.S. = lump \ sump$  $S.F. = square \ feet$ C.Y. = cubic yardsL.C.Y. = loose cubic yards Mo. = monthS.Y. = square yardEa.=each $L.F. = linear \ feet$  $M.S.F. = thousand \ square \ feet$ 

Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.

RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.

ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the quantity estimates:
  - a.) We assumed "swell" factor of 18% for excavated soils.
- b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number presented italics to the right of rounded subtotals is the unrounded summed value.

# Appendix D-2d

**Cost Estimates for Alternative SO-5** 

Note that this appendix includes costs which have been updated using those originally presented in the Draft FS (SHA, 2007) for alternative SO-5. Revisions were based on updated volumes of soils requiring remediation under this alternative.

## **Cost Estimate Summary for**

# Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos $\geq$ 1%) Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

# CAPITAL COSTS

CAPITAL COSTS	
Construction Activities Implementation Plans/Submittals	\$51,000
	, ,
EOSS Excavation	
Contractor	
Mobilization/Demobilization	\$4,900
Site Preparation	\$40,000
Excavation	\$36,000
Backfill	\$33,000
Site Restoration	\$190,000
Soil Stabilization	\$65,000
Transportation/Disposal	\$210,000
Subtotal, Contractor	\$580,000
Engineer	\$25,000
Laboratory	\$20,000
Subtotal, EOSS Excavation	\$630,000
Post-Construction Submittals/As-Builts	\$26,000
Subtotal, Construction Activities	\$702,000
Scope Contingency (15% Construction Activities Subtotal)	\$105,000
Bid Contingency (15% Construction Activities Subtotal)	\$105,000
Subtotal, Construction Activities with Contingencies	\$912,000
Professional/Technical Services	
Project Management (6% Construction Activities Subtotal w/Contingencies)	\$55,000
Remedial Design (12% Construction Activities Subtotal w/Contingencies)	\$109,000
Construction Management (8% Construction Activities Subtotal w/Contingencies)	\$73,000
Subtotal, Professional/Technical Services	\$237,000
Institutional Controls	
Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	\$15,000
TOTAL, CAPITAL COSTS	\$1,200,000
- ,	

## **Cost Estimate Summary for**

# Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos $\geq$ 1%) Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

ANNUAL	O&M	COSTS

$\Omega RM$	Activities
UKIVI	ACHVILLES

Maintain Cap/Cover
Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization \$690
Repairs to Soil Cover \$1,600
Pavement Restoration \$11,200
Subtotal, Earthwork Contractor \$14,000

Landscaping Contractor (Assume 2 visits annually) \$500 Engineer \$7,400

Subtotal, Maintain Cap/Cover \$21,000

Subtotal, O&M Activities Costs\$21,000Scope Contingency (25% O&M Activities Subtotal)\$5,300Bid Contingency (15% O&M Activities Subtotal)\$3,200

\$30,000

**Subtotal, O&M Activities with Contingencies** 

Professional/Technical ServicesProject Management (10% O&M Activities Subtotal w/Contingencies)\$3,000Technical Support (15% O&M Activities Subtotal w/Contingencies)\$4,500

Subtotal, Professional/Technical Services \$7,500

TOTAL, ANNUAL O&M COSTS \$38,000

#### PERIODIC COSTS

**Professional/Technical Services** 

Five-Year Review \$13,000
Subtotal, Professional/Technical Services \$13,000

TOTAL, PERIODIC COSTS \$13,000

#### **Cost Estimate Summary for**

# Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos $\geq$ 1%)

## **Feasibility Study**

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### PRESENT VALUE ANALYSIS

T	• •	T . 1.C .	Total Cost	Discount	
Type of Cost	<u>Year</u>	Total Cost	<u>Per Year</u>	<u>Factor</u>	Present Value
Capital Costs	0	\$1,200,000	\$1,200,000	1	\$ 1,200,000
Annual O&M Costs	1-100	\$3,800,000	\$38,000	14.3	\$540,000
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,000
Periodic Costs	10	\$13,000	\$13,000	0.508	\$7,000
Periodic Costs	15	\$13,000	\$13,000	0.362	\$5,000
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$900
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$600
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$400
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$80
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$60
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$40
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

#### TOTAL PRESENT VALUE OF ALTERNATIVE

\$1,800,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

Revision No.: 02

Date: April 2008

Detailed Cost Estimate for

#### Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos $\geq 1\%$ )

#### Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-5: Excavation and Off-Site Disposal	(TCE As DAUs Ashostos > 10/s)
50-5: Excavation and Oil-Site Disposal	(TCE, AS, PAHS, ASDESIOS ~ 170)

IPTION AL COSTS	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
onstruction Activities					
Implementation Plans/Submittals	1	\$51,000	Ea.	\$51,000	SHA estimate
EOSS Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader, Compactor, 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Loader, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399			ECHOS 33 17 0802; Includes water truck; Assur
Subtotal	Mohiliza	tion/Dem	obilization	\$4,900	H&S level D. \$4,898
Subtotal	, 1110011124	tion/Dem	obinzation	ψ1,200	Ψ,,070
Site Preparation Pavement removal, Bituminous driveways	5,802	\$5.72	S V	¢22 107	Means 02 41 13.17 5100
Erosion Control, Silt Fences, Vinyl, 3' high with	1,500	\$4.28			ECHOS 18 05 0206
7.5' posts	1,500	94.20	L.I'.	\$0,420	ECHOS 18 05 0200
-	Subto	tal, Site P	reparation	\$40,000	\$39,607
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic	56	\$215	Hr.	\$12,040	ECHOS 17 03 0231; Assumes H&S level D.
Excavator		Ф1.4.4	**	<b>#0.064</b>	EGHOG 17 02 0202 A H0 G1 1 D
926, 2.0 CY, Wheel Loader	56	\$144			ECHOS 17 03 0222; Assumes H&S level D.
Bobcat Water Truck	56 56	\$126 \$103			ECHOS Crew Code COBBC; Assumes H&S lev ECHOS Crew Code COKBM (Modified); Assum
water fruck	30	\$103	111.	\$5,700	H&S level D.
Sprayed Water Dust Suppressant	68,700	\$0.05			ECHOS 33 08 0585; Assumes H&S level D.
	S	Subtotal, l	Excavation	\$36,000	\$36,363
Backfill					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	\$199	Hr.	\$4,776	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	24	\$130	Hr.	\$3,120	ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24	\$344	Hr.	\$8,256	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	1388	\$12	C.Y.	\$16,656	ECHOS 02223 1001
		Subtota	al, Backfill	\$33,000	\$32,808
Site Restoration					
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	52,218	\$2.93	S.F.	\$152,999	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	1,451	\$14	L.C.Y	\$20,314	Means 31 23 23.18 1255
Topsoil, Furnish & Place, 6" Lifts, Off-site	305		C.Y.		ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader			M.S.F.		Means 32 92 19.13 0800
	Sub	total, Sub	contractor	\$190,000	\$190,493
Soil Stabilization					
Cement Stabilization, 6%	2,030	\$32	2 B.C.Y.	\$64,960	ECHOS 17 03 0602; Assumes ~1/4 of TCE-impa soil, 1/2 of the asbestos-impacted soil, & 3/4 of the PAH/As-impacted soil will require stabilization; Assumes H&S level D.

Revision No.: 02

Date: April 2008

**Detailed Cost Estimate for** 

#### Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos $\geq$ 1%)

#### Feasibility Study

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos  $\geq 1\%$ )

QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
725				SHA discussions with Waste Management, Inc.
600	\$54	Ton	. ,	SHA discussions with ESMI; Includes soil stabilizati additive.
90	\$80	Ton	\$7,200	SHA discussions with Waste Management, Inc.; Includes soil stabilization additive.
4,050	\$38	Ton	\$153,900	SHA discussions with Waste Management, Inc.; Includes soil stabilization additive.
btotal, Trai	nsportatio	n/Disposal	\$210,000	\$211,629
	-	_	\$580,000	\$580,758
220	\$99	hr	\$21,780	Assumes 4 weeks of field work
1	\$3,267	1.s.	\$3,267	Assumes 15% of labor cost
	Subtotal	, Engineer	\$25,000	\$25,047
10	\$965	Ea.	\$9,650	2006-2007 Fee Schedule, Alpha Woods Hole Labs
5	\$185	Ea.	\$925	2006-2007 Fee Schedule, Alpha Woods Hole Labs
5			\$250	SHA discussions with EMSL Analytical, Inc.
56	\$155	Ea.	\$8,680	2006-2007 Fee Schedule, Alpha Woods Hole Labs;
				Assumes 1 sample collected every 50 feet of lateral
				excavation extents
				2006-2007 Fee Schedule, Alpha Woods Hole Labs \$19,544
			\$630,000	\$625,349
1	\$26,00	0 Ea.	\$26,000	SHA estimate
ubtotal, Co	nstruction	Activities	\$702,000	
			\$105,000	
			\$105,000 \$105,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal OSWER 5-6: Assume 15% of Construction Activities
n Activities	with Con	tingencies	\$105,000	Subtotal
n Activities	with Con	tingencies		Subtotal OSWER 5-6: Assume 15% of Construction Activities
n Activities	s with Con	tingencies	\$105,000 <b>\$912,000</b>	Subtotal OSWER 5-6: Assume 15% of Construction Activities Subtotal OSWER 5-8: Assume 6% of Construction Activities
n Activities	s with Con	tingencies	\$105,000 <b>\$912,000</b>	Subtotal OSWER 5-6: Assume 15% of Construction Activities Subtotal OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities
n Activities	with Con	tingencies	\$105,000 \$912,000 \$55,000	Subtotal OSWER 5-6: Assume 15% of Construction Activities Subtotal OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activities
n Activities			\$105,000 \$912,000 \$55,000 \$109,000	Subtotal OSWER 5-6: Assume 15% of Construction Activities Subtotal OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities
			\$105,000 \$912,000 \$55,000 \$109,000 \$73,000	Subtotal OSWER 5-6: Assume 15% of Construction Activities Subtotal OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activities
			\$105,000 \$912,000 \$55,000 \$109,000 \$73,000	Subtotal OSWER 5-6: Assume 15% of Construction Activities Subtotal OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activities
		al Services	\$105,000 \$912,000 \$55,000 \$109,000 \$73,000	Subtotal OSWER 5-6: Assume 15% of Construction Activities Subtotal OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activities
Professiona	I/Technic: \$5,000	al Services	\$105,000 \$912,000 \$55,000 \$109,000 \$73,000	Subtotal  OSWER 5-6: Assume 15% of Construction Activities Subtotal  OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Professiona	Subtotal	Ea.	\$105,000 \$912,000 \$55,000 \$109,000 \$73,000 \$237,000	Subtotal  OSWER 5-6: Assume 15% of Construction Activities Subtotal  OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Professiona 3	\$5,000 Subtotal	Ea. , Engineer	\$105,000 \$912,000 \$55,000 \$109,000 \$73,000 \$237,000 \$15,000	Subtotal  OSWER 5-6: Assume 15% of Construction Activities Subtotal  OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies  OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
	600 90 4,050 btotal, Tran 5 220 1 10 5 5 56 3 Subtota	\$600   \$54     90		\$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,400   \$32,000   \$33,200   \$33,

Revision No.: 02

Date: April 2008

Detailed Cost Estimate for

Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos  $\geq 1\%$ )

Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos  $\geq 1\%$ )

UNIT

DESCRIPTION QTY COSTS UNITS COST COMMENTS/REFERENCE

ANNUAL O&M COSTS
O&M Activities

Maintain Cap/Cover

Mobilization/Demobilization Crew, 100 miles, per person	2	\$192	Ea	\$384	ECHOS 33 01 0204
Small Equipment	1	\$104			Means 01 54 36.50 1100; assumes 50 miles per
Sman Equipment	1	\$104	La.	φ10 <del>4</del>	mob/demob
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
0 1 1	Mobiliza	tion/Demo	bilization =	\$690	\$688
Repairs to Soil Cover				****	
Bobcat	8	\$126			ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	10		C.Y.		ECHOS 08 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	0.8	\$27	M.S.F.	\$22	Means 32 92 19.13 0800
	ubtotal, R	epairs to	Soil Cover	\$1,600	\$1,580
D. C. C.					
Pavement Restoration Pavement removal, Bituminous driveways	291	\$5.71	S V	\$1.662	Means 02 41 13.17 5100; Assumes 5% of paved are
· ·	291	φ3./1	5.1.		replaced annually.
Transportation & Disposal, Asphalt	36		Ton		SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways, 6	2,611	\$2.93	S.F.	\$7,650	Means 32 12 16.14 0020; Assumes 5% of paved are replaced annually.
Hauling, 20 C.Y. dump truck, 20 mile round trip	73	\$14	L.C.Y	\$1,015	Means 31 23 23.18 1255
Sul	btotal, Pa	vement R	estoration =	\$11,200	\$11,234
			ontractor	\$14,000	\$13,501
Landscaping Contractor (Assume 2 visits annually)					
Mowing, 1st event		\$250.00		\$250	SHA estimate.
Mowing, 2nd event					
-		\$250.00		\$250	SHA estimate.
-			M.S.F	\$250 \$500	SHA estimate. \$500
Subte					
Subte Engineer	otal, Land	lscaping (	Contractor	\$500	\$500
Subto  Engineer  Labor, Quarterly Inspections			Contractor	\$500	
Subte Engineer	otal, Land	lscaping (	Ea.	\$500 \$3,960	\$500 Unit cost assumes 10 labor hours at an average rate
Subto  Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	otal, Land	dscaping (	Ea. L.S.	\$500 \$3,960 \$594	\$500 Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.
Subto  Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	otal, Land 4	\$990 \$594	Ea. L.S. Hr.	\$500 \$3,960 \$594	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.
Subto  Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation	4 1	\$990 \$594 \$124	Ea. L.S. Hr.	\$500 \$3,960 \$594 \$2,728 \$137	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.
Subto  Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation Misc. Office Expenses (e.g., reproduction,	4 1	\$990 \$594 \$124 \$137	Ea. L.S. Hr.	\$500 \$3,960 \$594 \$2,728	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	4 1 22 1	\$990 \$594 \$124 \$137 <b>Subtotal</b>	Ea. L.S. Hr. L.S.	\$500 \$3,960 \$594 \$2,728 \$137	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	4 1 22 1	\$990 \$594 \$124 \$137 Subtotal	Ea. L.S. Hr. L.S. , Engineer	\$500 \$3,960 \$594 \$2,728 \$137 \$7,400	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Summary Report Preparation	4 1 22 1	\$990 \$594 \$124 \$137 Subtotal	Ea. L.S. Hr. L.S. , Engineer Cap/Cover	\$500 \$3,960 \$594 \$2,728 \$137 \$7,400 \$21,000	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.  \$7,419 \$21,420
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	4 1 22 1	\$990 \$594 \$124 \$137 Subtotal	Ea. L.S. Hr. L.S. , Engineer Cap/Cover	\$500 \$3,960 \$594 \$2,728 \$137 \$7,400 \$21,000	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.  \$7,419 \$21,420
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Summary Report Preparation	4 1 22 1	\$990 \$594 \$124 \$137 Subtotal	Ea. L.S. Hr. L.S. , Engineer Cap/Cover	\$500 \$3,960 \$594 \$2,728 \$137 \$7,400 <b>\$21,000</b> \$21,000	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	4 1 22 1 ubtotal, N	\$990 \$594 \$124 \$137 Subtotal Maintain (	Ea. L.S. Hr. L.S. , Engineer Cap/Cover	\$500 \$3,960 \$594 \$2,728 \$137 \$7,400 <b>\$21,000</b> \$21,000	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.  \$7,419  \$21,420  OSWER 5-6: Assume 25% of O&M Activities Subt
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Sumplies, telephone/fax, postage, etc.)	4 1 22 1 ubtotal, N	\$990 \$594 \$124 \$137 Subtotal Maintain (	Ea. L.S. Hr. L.S. , Engineer Cap/Cover	\$500 \$3,960 \$594 \$2,728 \$137 \$7,400 <b>\$21,000</b> \$5,300 \$3,200	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.  \$7,419  \$21,420  OSWER 5-6: Assume 25% of O&M Activities Subt
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Supplies, telephone/fax, postage, etc.)  Subtotal Contingency (15% O&M Activities Subtotal)  Subtotal, O&M Activities Subtotal	4 1 22 1 ubtotal, N	\$990 \$594 \$124 \$137 Subtotal Maintain (	Ea. L.S. Hr. L.S. , Engineer Cap/Cover	\$500 \$3,960 \$594 \$2,728 \$137 \$7,400 \$21,000 \$5,300 \$3,200	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.  \$7,419  \$21,420  OSWER 5-6: Assume 25% of O&M Activities Subtom OSWER 5-6: Assume 15% of O&M Activities Subtom OSWER 5-8: Assume 10% of O
Engineer  Labor, Quarterly Inspections  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Labor, Annual Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)  Summary Report Preparation  Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	4 1 22 1 ubtotal, N	\$990 \$594 \$124 \$137 Subtotal Maintain (	Ea. L.S. Hr. L.S. , Engineer Cap/Cover	\$500 \$3,960 \$594 \$2,728 \$137 \$7,400 \$21,000 \$5,300 \$3,200 \$30,000	\$500  Unit cost assumes 10 labor hours at an average rate \$99/hr. See Note 3.  Assume 15% of field labor cost.  See Note 3.  Assume 5% of report preparation labor cost.  \$7,419  \$21,420  OSWER 5-6: Assume 25% of O&M Activities Subtons Cost Subsequence of the cost of the

\$7,500

\$38,000

Subtotal, Professional/Technical Services

Detailed Cost Estimate for

#### Alternative SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos $\geq 1\%$ )

#### Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-5: Excavation and Off-Site Disposal (TCE, As, PAHs, Asbestos  $\geq 1\%$ )

UNIT

QTY COSTS UNITS

COST

COMMENTS/REFERENCE

Revision No.: 02

Date: April 2008

PERIODIC COSTS

DESCRIPTION

Professional/Technical Services Five-Year Review

Engineer

igineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of
					\$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone,	1	\$620	L.S.	\$620	Assume 5% of labor costs.
postage, etc.)					
				010.000	#12.020

**Subtotal, Engineer** \$13,000 \$13,020

Subtotal, Five-Year Review \$13,000 \$13,020

Subtotal, Professional/Technical Services \$13,000

\$13,000

TOTAL, PERIODIC COSTS

Abbreviations:

 $B.C.Y. = bank \ cubic \ yards \\ C.Y. = cubic \ yards \\ H. = hour \\ L.C.Y. = loose \ cubic \ yards \\ Mo. = month \\ S.Y. = square \ feet \\ S.Y. = square \ yard \\ S.Y. = square \ yard$ 

Ea. = each L.F. = linear feet M.S.F. = thousand square feet

Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.

RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.

ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the quantity estimates:
  - a.) We assumed "swell" factor of 18% for excavated soils.
  - b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

## Appendix D-2e

**Cost Estimates for Alternative SO-6** 

Note that this appendix includes costs which have been developed using those originally presented in the Draft FS (SHA, 2007) for alternative SO-5. Updates were based on volumes of soils requiring remediation under this alternative.

#### **Cost Estimate Summary for**

## Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive) Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

## CAPITAL COSTS

CAPITAL COSTS	
Construction Activities	
Implementation Plans/Submittals	\$51,000
EOSS Excavation	
Contractor	
Mobilization/Demobilization	\$9,900
Site Preparation	\$45,000
Excavation	\$74,000
Backfill	\$145 ,000
Site Restoration	\$207,000
Soil Stabilization	\$90,000
Transportation/Disposal	\$501,000
Subtotal, Contractor	\$1,070 ,000
Engineer	\$37,000
Laboratory	\$33,000
Subtotal, EOSS Excavation	\$1,140 ,000
Post-Construction Submittals/As-Builts	\$26,000
Subtotal, Construction Activities	\$1,217,000
Scope Contingency (15% Construction Activities Subtotal)	\$183,000
Bid Contingency (15% Construction Activities Subtotal)	\$183,000
Subtotal, Construction Activities with Contingencies	\$1,583,000
Professional/Technical Services	
Project Management (6% Construction Activities Subtotal w/Contingencies)	\$95,000
Remedial Design (12% Construction Activities Subtotal w/Contingencies)	\$190,000
Construction Management (8% Construction Activities Subtotal w/Contingencies)	\$127,000
Subtotal, Professional/Technical Services	\$412,000
Institutional Controls	
Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	\$15,000
TOTAL, CAPITAL COSTS	\$2,010,000

# Cost Estimate Summary for Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive) Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

ANNUAL O&M COSTS

O&M Activities

None

PERIODIC COSTS

**Professional/Technical Services**Five-Year Review

**Subtotal, Professional/Technical Services** 

\$13,000 **\$13,000** 

TOTAL, PERIODIC COSTS

\$13,000

#### **Cost Estimate Summary for**

## Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)

#### **Feasibility Study**

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### PRESENT VALUE ANALYSIS

Type of Cost	Vaan	Total Cost	Total Cost	<u>Discount</u>	Program4 Value
Type of Cost	<u>Year</u>	Total Cost	<u>Per Year</u>	<u>Factor</u>	Present Value
Capital Costs	0	\$2,010,000	\$2,010,000	1	\$2,010,000
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,000
Periodic Costs	10	\$13,000	\$13,000	0.508	\$7,000
Periodic Costs	15	\$13,000	\$13,000	0.362	\$5,000
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$900
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$600
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$400
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$80
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$60
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$40
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

#### TOTAL PRESENT VALUE OF ALTERNATIVE

\$2,040,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

## TABLE D-2e.2 Detailed Cost Estimate for

# Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive) Feasibility Study Blackburn & Union Privileges Superfund Site

UNIT

## Walpole, Massachusetts

SO-6: Excavation and Off-Site Disposal (Comp
--

DEVON		OFF	UNIT	* IN IMPO	GO GE	
PTION L COSTS		QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
onstruction Activi	ies					
Implementat	ion Plans/Submittals	1	\$51,000	Ea.	\$51,000	SHA estimate
EOSS Excav	ation					
Contractor						
Mobi	lization/Demobilization					
	Demob, General Equipment and Facilities	1	\$5,000			Assumed allowance
Mob/l	Demob, Loader, Compactor, 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/	Demob, Excavator, Loader, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/	Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decor	ntaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decor	ntaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.
		Subtotal, N	Iobilization/E	Demobilization	\$9,900	\$9,898
	reparation					
	Locating	1	\$2,000			Assumed 1-day allowance
	nent removal, Bituminous driveways	6346	\$5.72	S.Y.		Means 02 41 13.17 5100
Erosio	on Control, Silt Fences, Vinyl, 3' high with 7.5' posts	1500	\$4.28	L.F.	\$6,420	ECHOS 18 05 0206
		'	Subtotal, Sit	e Preparation	\$45,000	\$44,719
Excav						
Crawl	er-mounted, 1.25 C.Y. 225 Hydraulic Excavator	120	\$215	Hr.	\$25,800	ECHOS 17 03 0231; Assumes H&S level D.
926, 2	2.0 CY, Wheel Loader	120	\$144			ECHOS 17 03 0222; Assumes H&S level D.
Bobca	ıt	120	\$126	Hr.	\$15,120	ECHOS Crew Code COBBC; Assumes H&S level D.
Water	Truck	120	\$103	Hr.	\$12,360	ECHOS Crew Code COKBM (Modified); Assumes H&S level D.
Spray	ed Water Dust Suppressant	73600	\$0.05	S.F.	\$3,680	ECHOS 33 08 0585; Assumes H&S level D.
			Subtota	al, Excavation	\$74,000	\$74,240
Backt	ill					
Crawl	er-mounted, 1.25 C.Y. 225 Hydraulic Excavator	80	\$199	Hr.	\$15,920	ECHOS 17 03 0231
926, 2	2.0 CY, Wheel Loader	80	\$130	Hr.	\$10,400	ECHOS 17 03 0222
Roller	, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	80	\$344	Hr.	\$27,520	ECHOS Crew Code COFCQ (Modified)
Uncla	ssified Fill, Delivered, Off-site	7570	\$12	C.Y.	\$90,835	ECHOS 02223 1001; Assume 1.2 factor times volume removed
		<u> </u>	Sub	total, Backfill	\$145,000	\$144,675
Site F	estoration					
	ltic Concrete Pavement, Lots & Driveways, 6" stone 2" binder course, 1" topping	57118	\$2.93	S.F.	\$167,356	Means 32 12 16.14 0020
	ng, 20 C.Y. dump truck, 20 mile round trip	1587	\$14	C.Y.	\$22,218	Means 31 23 23.18 1255
Hauli					\$16.775	ECHOS 18 05 0301
	ail Furnish & Place 6" Lifts Off-site	305	\$55	CY		
Topso	sil, Furnish & Place, 6" Lifts, Off-site anical Seeding, Grass seed hand push spreader	305 15	\$55 \$27	C.Y. M.S.F.		Means 32 92 19.13 0800
Topso			\$27			Means 32 92 19.13 0800
Topsc Mech			\$27	M.S.F.	\$405	Means 32 92 19.13 0800

Page 1 of 3 SO-6.xls

## TABLE D-2e.2 Detailed Cost Estimate for

#### Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)

### Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### SO-6: Excavation and Off-Site Disposal (Comprehensive)

Excavation and Off-Site Disposal (Comprehensive)		******			
RIPTION  Transportation/Disposal	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Asphalt	793	\$25	Ton	\$19,825	SHA discussions with Waste Management,
VOC-Impacted Soils, Non-Hazardous	600		Ton		SHA discussions with ESMI; Includes soil stabilization additive.
Asbestos-Impacted Soils, Non-Hazardous	90	\$80	Ton	\$7,200	SHA discussions with Waste Management, Includes soil stabilization additive.
Non-Asbestos Impacted Soils, Non-Hazardous	11610	\$38	Ton	\$441,180	SHA discussions with Waste Management, Includes soil stabilization additive.
	Subtota	al, Transporta	ation/Disposal	\$501,000	\$500,605
		Subtota	al, Contractor	\$1,070,000	\$1,070,491
Engineer					
Labor	240	\$99	hr	\$23,760	Assumes 6 weeks of field work
Misc. Field Expenses (e.g., mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$3,564	L.F.	\$3,564	Assumes 15% of labor cost
Air/dust Monitoring	10	\$1,000	day	\$10,000	Assumed allowance
<u> </u>		Subt	otal, Engineer	\$37,000	\$37,324
Laboratory					
Chemical analysis, Soil Management Assessment Package I	22	\$965	Ea.	\$21,230	2006-2007 Fee Schedule, Alpha Woods Ho Labs; Assumes 15 for soils leaving site and backfill soils
Chemical analysis, TCE Confirmatory	5	\$185	Ea.	\$925	2006-2007 Fee Schedule, Alpha Woods Ho Labs
Chemical analysis, Asbestos Confirmatory	5	\$50	Ea.	\$250	SHA discussions with EMSL Analytical, In
Chemical analysis, PAHs Confirmatory	66	\$155	Ea.	\$10,230	2006-2007 Fee Schedule, Alpha Woods He Labs; Assumes 1 sample collected every 50 of lateral excavation extents; plus 10 for de excavations
Chemical analysis, As Confirmatory	3	\$13	Fa	\$39	Assumes 15% of labor cost
Post-Construction Submittals/As-Builts	1	\$26,000			SHA estimate
	Subtot	tal, Construc	tion Activities	\$1,217,000	
Scope Contingency (15% Construction Activities Subtotal)				\$183,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$183,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
•	onstruction Ac	ctivities with	Contingencies	\$1,583,000	
Professional/Technical Services					
Project Management (6% Construction Activities Subtotal w/Contingencies)				\$95,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Remedial Design (12% Construction Activities Subtotal w/Contingencies)				\$190,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
Construction Management (8% Construction Activities Subtotal w/Contingencies)				\$127,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
	Subtotal, Profe	essional/Tech	mical Services	\$412,000	
Institutional Controls					
Establish Deed Restrictions					
Establish Deed Restrictions  Engineer					
Establish Deed Restrictions	3	\$5,000	Еа.	\$15,000	SHA estimate; Costs estimated based on nu of properties requiring deed restrictions.
Establish Deed Restrictions  Engineer  Establish Institutional Controls in the form of Deed	3		Ea. otal, Engineer	\$15,000 \$15,000	-
Establish Deed Restrictions  Engineer  Establish Institutional Controls in the form of Deed		Subt			of properties requiring deed restrictions.

Page 2 of 3 SO-6.xls

TOTAL, CAPITAL COSTS \$2,010,000

#### **Detailed Cost Estimate for**

#### Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)

#### Feasibility Study

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SO-6: Excavation and Off-Site Disposal (Comprehensive)

UNIT

OTY

COSTS UNITS

COST

COMMENTS/REFERENCE

PERIODIC COSTS

DESCRIPTION

Professional/Technical Services Five-Year Review

Engineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of
					\$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone,	1	\$620	L.S.	\$620	Assume 5% of labor costs.
postage, etc.)					
		~		***	444.040

Subtotal, Engineer \$13,000 \$13,020

Subtotal, Five-Year Review \$13,000 \$13,020

Subtotal, Professional/Technical Services \$13,000

TOTAL, PERIODIC COSTS

\$13,000

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hourL.S. = lump sump S.F. = square feetC.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = monthS.Y. = square yard

L.F. = linear feet Ea. = each M.S.F. = thousand square feet

Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.

RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.

ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the quantity estimates:
  - a.) We assumed "swell" factor of 18% for excavated soils.
- b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.
- 8. Assume no utility lines need to be cut/removed/replaced.
- 9. Assume backfill can be placed immediately following excavation to required depths.
- 10. Excavated soil will be loaded directly into vehicles for off-site disposal.

# APPENDIX D-3 AOC ALTERNATIVE COST ESTIMATES

## Appendix D-3a

**Cost Estimates for Alternative AOC-2** 

Cost Estimate Summary for

## Alternative AOC-2: Limited Action Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

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$\cup_{A}$			<i>-</i>	US.	LO

Ins	titu	tional	Conti	rols

Establish Deed Restrictions \$15,000

Subtotal, Institutional Controls \$15,000

#### TOTAL CAPITAL COSTS

\$15,000

\$6,400

Revision No.: 01 - DRAFT

Date: October 2007

#### ANNUAL O&M COSTS

#### **O&M** Activities

Maintain AOC Cap

Subtotal, Earthwork Contractor

Earthwork Contractor (Assume 1 visit annually)
Mobilization/Demobilization
Repairs to Soil Cap
Pavement Restoration
\$3,900

Landscaping Contractor (Assume 2 visits annually) \$560 Engineer \$7,400

Subtotal, Maintain AOC Cap \$14,000

Subtotal, O&M Activities\$14,000Scope Contingency (15% Annual O&M Subtotal)\$2,100Bid Contingency (15% Annual O&M Subtotal)\$2,100

Subtotal, O&M Activities w/Contingencies \$18,000

#### **Professional/Technical Services**

Project Management (10% Annual O&M Subtotal w/Contingencies) \$1,800
Technical Support (15% Annual O&M Subtotal w/Contingencies) \$2,700

Subtotal, Professional/Technical Services \$4,500

TOTAL ANNUAL O&M COSTS

\$23,000

Cost Estimate Summary for Alternative AOC-2: Limited Action Feasibility Study

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

PERIODIC COSTS

Construction/O	&M	Activitie	S
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Every 5 Years O&M Activities
Maintain Security Fence (every 5 years)

\$8,200

Revision No.: 01 - DRAFT

Date: October 2007

Subtotal, Every 5 Years O&M Activities \$8,200
Scope Contingency (15% Every 5 Years O&M Subtotal) \$1,200
Bid Contingency (15% Every 5 Years O&M Subtotal) \$1,200
Subtotal, Every 5 Years O&M Activities w/Contingencies \$11,000

#### Subtotal, Construction/O&M Activities

\$11,000

#### **Professional/Technical Services**

Project Management (10% Periodic Construction/O&M Activities Subtotal)
Technical Support (15% Periodic Construction/O&M Activities Subtotal)
Five-Year Review

\$1,100 \$1,650 \$13,000

#### Subtotal, Professional/Technical Services

\$16,000

#### TOTAL PERIODIC COSTS

\$27,000

#### PRESENT VALUE ANALYSIS

			Total Cost	<u>Discount</u>	
Type of Cost	<u>Year</u>	Total Cost	Per Year	<u>Factor</u>	Present Value
Capital Costs	0	\$15,000	\$15,000	1	\$15,000
Annual O&M Costs	1-100	\$2,300,000	\$23,000	14.3	\$330,000
Periodic Costs	5	\$27,000	\$27,000	0.713	\$19,000
Periodic Costs	10	\$27,000	\$27,000	0.508	\$14,000
Periodic Costs	15	\$27,000	\$27,000	0.362	\$9,800
Periodic Costs	20	\$27,000	\$27,000	0.258	\$7,000
Periodic Costs	25	\$27,000	\$27,000	0.184	\$5,000
Periodic Costs	30	\$27,000	\$27,000	0.131	\$3,500
Periodic Costs	35	\$27,000	\$27,000	0.0937	\$2,500
Periodic Costs	40	\$27,000	\$27,000	0.0668	\$1,800
Periodic Costs	45	\$27,000	\$27,000	0.0476	\$1,300
Periodic Costs	50	\$27,000	\$27,000	0.0339	\$920
Periodic Costs	55	\$27,000	\$27,000	0.0242	\$650
Periodic Costs	60	\$27,000	\$27,000	0.0173	\$470
Periodic Costs	65	\$27,000	\$27,000	0.0123	\$330
Periodic Costs	70	\$27,000	\$27,000	0.00877	\$240
Periodic Costs	75	\$27,000	\$27,000	0.00625	\$170
Periodic Costs	80	\$27,000	\$27,000	0.00446	\$120
Periodic Costs	85	\$27,000	\$27,000	0.00318	\$86
Periodic Costs	90	\$27,000	\$27,000	0.00227	\$61
Periodic Costs	95	\$27,000	\$27,000	0.00162	\$44
Periodic Costs	100	\$27,000	\$27,000	0.00115	\$31

#### TOTAL PRESENT VALUE OF ALTERNATIVE

\$412,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

#### TABLE D-3a.2 **Detailed Cost Estimate for Alternative AOC-2: Limited Action** Feasibility Study

Revision No.: 01 - DRAFT Date: October 2007

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**AOC-2: Limited Action** 

DESCRIPTION

CAPITAL COST ELEMENTS **Institutional Controls** 

**Establish Deed Restrictions** 

UNIT

COSTS UNITS

COST

COMMENTS/REFERENCE

Engineer

\$15,000 SHA estimate; Costs estimated based on number of Establish Institutional Controls in the form of Deed \$5,000 Ea. Restrictions properties requiring deed restrictions. Subtotal, Engineer \$15,000

> **Subtotal, Establish Deed Restrictions** \$15,000

> > **Subtotal, Institutional Controls** \$15,000

TOTAL CAPITAL COSTS

\$15,000

#### ANNUAL O&M COST ELEMENTS **O&M** Activities

**Maintain AOC Cap** 

Earthwork Contract	tor (Assume .	1 visit annually)
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Mobilization/Demobilization					
Equipment, Truck 2 Axle, Highway, 33,000 GVW, 6x2,2	1	\$452	Day	\$452	ECHOS 33 01 0111
Crew, 100 miles, per person	2	\$192	Ea.	\$384	ECHOS 33 01 0204
Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per
					mob/demob.
Subto	al, Mobili	zation/Dem	obilization	\$940	\$940
Repairs to Soil Cap					
Bobcat	8	\$126	Hr.	\$1,008	ECHOS Crew Code COBBC; Assumes H&S level I
Topsoil, Furnish & Place, 6" Lifts, Off-site	10	\$55	C.Y.	\$550	ECHOS 08 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	1	\$27	M.S.F.	\$27	Means 32 92 19.13 0800; Assumes 5% of soil capped AOC is re-seeded annually.
- î	Subtot	al, Repairs t	o Soil Cap	\$1,600	\$1,558
		-	-		
Pavement Restoration					
Pavement Removal, Bituminous driveway	106	\$5.71	S.Y.	\$606	Means 02 41 13.17 5100; Assumes 5% of paved AC
•					is replaced annually.
Transportation and Disposal, Asphalt	14	\$25	Ton	\$350	SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways,	950	\$2.93	S.F.	\$2,784	Means 32 12 16.14 0020; Assumes 5% of paved AC
6" stone base, 2" binder course, 1" topping					is replaced annually.
Hauling, 20 C.Y. dump truck, 20 mile round trip	9	\$14	L.C.Y	\$123	Means 31 23 23.18 1255
1	Subtotal,	Pavement I	Restoration ===	\$3,900	\$3,863
	Subtotal.	Earthwork	Contractor	\$6,400	\$6.361
				40,100	+-,
ndscaping Contractor (Assume 2 visits annually)					
Mowing soil capped AOC, 1st event	93	\$3.00	M.S.F.	\$279	Means 32 01 90.19 4160
S	ubtotal, L	andscaping	Contractor	\$560	\$558
gineer					
Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate
M: F: 11 F (	1	0504	T C	Ø50.4	\$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal	1	\$594	L.S.	\$594	Assume 15% of labor cost for quarterly inspections.
protective equipment, field supplies, telephone,	25	<b></b>		#2.55°	0. 27 2
Labor, Annual Summary Report Preparation	22	\$124			See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of labor cost for report preparation.

Subtotal, Maintain AOC Cap

Subtotal, Engineer

\$14,000

\$7,400

\$14,338

\$7,419

# TABLE D-3a.2 Detailed Cost Estimate for Alternative AOC-2: Limited Action Feasibility Study Blackburn & Union Privileges Superfund Site

Walpole, Massachusetts

LE D-3a.2 Revision No.: 01 - DRAFT bet Estimate for Date: October 2007
C-2: Limited Action

**AOC-2: Limited Action** 

		UNIT			
ESCRIPTION	QTY Sub	COSTS ototal, O&M	UNITS I Activities	COST \$14,000	COMMENTS/REFERENCE
Scope Contingency (15% Annual O&M Subtotal)				\$2,100	OSWER 5-6: Assume 15% of O&M Subtotal
Bid Contingency (15% Annual O&M Subtotal)				\$2,100	OSWER 5-6: Assume 15% of O&M Subtotal
Subtotal, C	O&M Acti	vities w/Cor	ntingencies	\$18,000	-
Professional/Technical Services					
Professional/Technical Services Project Management (10% Annual O&M Subtotal w/Co	ontingenci	ies)		\$1,800	OSWER 5-8: Assume 10% of Annual O&M Subtotal including contingencies
Project Management (10% Annual O&M Subtotal w/Con Technical Support (15% Annual O&M Subtotal w/Con	tingencies		al Services		including contingencies OSWER 5-8: Assume 15% of Annual O&M Subtotal

#### PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years)

Earthwork	Contractor
Luiuwoik	Communion

Security Fence					
Fence, chain link industrial, schedule 40, 2" 228 \$36 L.F.				\$8,208	Means 32 31 13.20 0500; Assumes 10% of security
posts @ 10' O.C., set in concrete, 6' H, 3 strands					fence is repaired every 5 years.
barb wire, 6 ga. wire, galv. steel					
Su	btotal, Ea	rthwork (	Contractor	\$8,200	\$8,208
Subtotal, Maintain	Security F	ence (ever	y 5 years)	\$8,200	\$8,208
Subtotal, I	Every 5 Ye	ars O&M	Activities	\$8,200	
Scope Contingency (15% Every 5 Years O&M Subtotal)				\$1,200	OSWER 5-6: Assume 15% of Periodic Maintenance
					Costs Subtotal
Bid Contingency (15% Every 5 Years O&M Subtotal)				\$1,200	OSWER 5-6: Assume 15% of Periodic Maintenance
					Costs Subtotal
Subtotal, Every 5 Years O&	M Activit	ies w/Con	tingencies	\$11,000	
Subtotal	Construct	ion/O&M	Activities	\$11,000	

#### TABLE D-3a.2 **Detailed Cost Estimate for Alternative AOC-2: Limited Action Feasibility Study**

Revision No.: 01 - DRAFT Date: October 2007

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

**AOC-2: Limited Action** 

SCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% Periodic Construction/O&M A	ctivities	Subtotal)		\$1,100	OSWER 5-8: Assume 10% of Periodic Construction/O&M Activities Subtotal (includes contingencies)
Technical Support (15% Periodic Construction/O&M Acti	vities Si	ıbtotal)		\$1,650	OSWER 5-8: Assume 15% of Periodic Construction/O&M Activities Subtotal (includes contingencies)

#### Five-Year Review

Engineer

Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate
					of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone,	1	\$620	L.S.	\$620	Assume 5% of labor costs.
postage, etc.)					
		Subtotal,	Engineer	\$13,000	\$13,020

Subtotal, Five Year Review \$13,000

Subtotal, Professional/Technical Services \$16,000

> TOTAL PERIODIC COSTS \$27,000

 $\underline{Abbreviations:}$ 

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sump  $S.F. = square \ feet$ C.Y. = cubic yardsL.C.Y. = loose cubic yardsMo. = month $S.Y. = square \ yard$ 

Ea. = eachL.F. = linear feet M.S.F. = thousand square feet

#### Notes:

"Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition. RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.

ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 6. All subtotals and total are rounded to 2 significant numbers. The number presented initalics to the right of rounded subtotals is the unrounded summed value.

## Appendix D-3b

**Cost Estimates for Alternative AOC-3** 

Revision No.: 01 - DRAFT **Cost Estimate Summary for** Date: October 2007

#### Alternative AOC-3: Maintain Existing Soil Cap on AOC, **Excavate Settling Basin #2 Containment Cell, Off-Site Disposal Feasibility Study**

#### **Blackburn & Union Privileges Superfund Site** Walpole, Massachusetts

#### **CAPITAL COSTS**

Construction Activities	
Implementation Plans/Submittals	\$24,000
Settling Basing #2 Excavation	
Contractor	
Mobilization/Demobilization	\$3,300
Site Preparation	\$1,300
Excavation	\$27,000
Backfill	\$11,000
Site Restoration	\$2,500
Transportation/Disposal	\$180,000
Subtotal, Contractor	\$230,000
Engineer	\$13,000
Laboratory	\$4,800
Subtotal, Settling Basin #2 Excavation	\$240,000
Post-Construction Submittals/As-Builts	\$12,000
Subtotal, Construction Activities	\$276,000
Scope Contingency (15% Construction Activities Subtotal)	\$40,000
Bid Contingency (15% Construction Activities Subtotal)	\$41,000
Subtotal, Construction Activities w/Contingencies	\$360,000
Professional/Technical Services	
Remedial Design (15% Construction Activities Subtotal w/Contingencies)	\$54,000
Project management (8% Construction Activities Subtotal w/Contingencies) Construction Management (10% Construction Activities Subtotal	\$29,000
w/Contingencies)	\$36,000
Subtotal, Professional/Technical Services	\$120,000
Institutional Controls	
Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	\$15,000
TOTAL CAPITAL COSTS	\$500,000

**Cost Estimate Summary for** 

Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal **Feasibility Study** 

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

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O&M Activities	
Maintain AOC Cap	
Earthwork Contractor (Assume 1 visit annually)	
Mobilization/Demobilization	\$940
Repairs to Soil Cap	\$1,600
Pavement Restoration	\$3,900
Subtotal, Earthwork Contractor	\$6,400
Landscaping Contractor (Assume 2 visits annually)	\$560
Engineer	\$7,400
Subtotal, Maintain AOC Cap	\$14,000
Subtotal, O&M Activities	\$14,000
Scope Contingency (15% O&M Subtotal)	\$2,100
Bid Contingency (15% O&M Subtotal)	\$2,100
Subtotal, O&M Activities w/Contingencies	\$18,000
Professional/Technical Services	
Project Management (10% O&M Subtotal w/Contingencies)	\$1,800

### TOTAL ANNUAL O&M COST

422	$\Lambda \Lambda \Lambda$
\$23.	ww.

Revision No.: 01 - DRAFT

Date: October 2007

#### PERIODIC COSTS

#### Construction/O&M Activities

Subtotal, Professional/Technical Services

Every 5 Years O&M Activities Maintain Security Fence (every 5 years)

Technical Support (15% O&M Subtotal w/Contingencies)

\$8,200

Subtotal, Every 5 Years O&M Activities	\$8,200
Scope Contingency (15% Every 5 Years O&M Activities Subtotal)	\$1,200
Bid Contingency (15% Every 5 Years O&M Activities Subtotal)	\$1,200
Subtotal, Every 5 Years O&M Activities w/Contingencies	\$11,000

#### Subtotal, Construction/O&M Activities

\$11,000

\$1,100

\$1,700

\$13,000

\$16,000

#### **Professional/Technical Services**

Project Management (10% Construction/O&M Activities Subtotal w/Contingenc Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies Five-Year Review Subtotal, Professional/Technical Services

\$27,000

TOTAL PERIODIC COSTS

Revision No.: 01 - DRAFT Date: October 2007

#### Cost Estimate Summary for Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	<u>Total Cost</u>	Total Cost Per Year	<u>Discount</u> <u>Factor</u>	Present Value
Capital Costs	0	\$500,000	\$500,000	1	\$500,000
Annual O&M Costs	1-100	\$2,300,000	\$23,000	14.3	\$330,000
Periodic Costs	5	\$27,000	\$27,000	0.713	\$19,000
Periodic Costs	10	\$27,000	\$27,000	0.508	\$14,000
Periodic Costs	15	\$27,000	\$27,000	0.362	\$9,800
Periodic Costs	20	\$27,000	\$27,000	0.258	\$7,000
Periodic Costs	25	\$27,000	\$27,000	0.184	\$5,000
Periodic Costs	30	\$27,000	\$27,000	0.131	\$3,500
Periodic Costs	35	\$27,000	\$27,000	0.0937	\$2,500
Periodic Costs	40	\$27,000	\$27,000	0.0668	\$1,800
Periodic Costs	45	\$27,000	\$27,000	0.0476	\$1,300
Periodic Costs	50	\$27,000	\$27,000	0.0339	\$920
Periodic Costs	55	\$27,000	\$27,000	0.0242	\$650
Periodic Costs	60	\$27,000	\$27,000	0.0173	\$470
Periodic Costs	65	\$27,000	\$27,000	0.0123	\$330
Periodic Costs	70	\$27,000	\$27,000	0.00877	\$240
Periodic Costs	75	\$27,000	\$27,000	0.00625	\$170
Periodic Costs	80	\$27,000	\$27,000	0.00446	\$120
Periodic Costs	85	\$27,000	\$27,000	0.00318	\$86
Periodic Costs	90	\$27,000	\$27,000	0.00227	\$61
Periodic Costs	95	\$27,000	\$27,000	0.00162	\$44
Periodic Costs	100	\$27,000	\$27,000	0.00115	\$31

#### TOTAL PRESENT VALUE OF ALTERNATIVE

\$900,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

**Detailed Cost Estimate for** Date: October 2007 Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

Revision No.: 01 - DRAFT

#### Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
UNIT

Ea. \$834  Ea. \$1,226  Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300	H&S level D. \$3,257  ECHOS 18 05 0206  \$1,284  ECHOS 17 03 0232; Assumes H&S level C.  ECHOS Crew Code COKBM (Modified); Assum
Ea. \$834  Ea. \$1,226  Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300  Hr. \$19,632	Means 01 54 36.50 0020; assumes 50 miles per mob/demob Means 01 54 36.50 0100; assumes 50 miles per mob/demob ECHOS 33 17 0802; Includes water truck; Assun H&S level D. \$3,257  ECHOS 18 05 0206 \$1,284
Ea. \$834  Ea. \$1,226  Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300  Hr. \$19,632	Means 01 54 36.50 0020; assumes 50 miles per mob/demob Means 01 54 36.50 0100; assumes 50 miles per mob/demob ECHOS 33 17 0802; Includes water truck; Assun H&S level D. \$3,257  ECHOS 18 05 0206 \$1,284
Ea. \$834  Ea. \$1,226  Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300  Hr. \$19,632	Means 01 54 36.50 0020; assumes 50 miles per mob/demob Means 01 54 36.50 0100; assumes 50 miles per mob/demob ECHOS 33 17 0802; Includes water truck; Assun H&S level D. \$3,257  ECHOS 18 05 0206 \$1,284
Ea. \$1,226 Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300  Hr. \$19,632	mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assun H&S level D.  \$3,257  ECHOS 18 05 0206  \$1,284  ECHOS 17 03 0232; Assumes H&S level C.
Ea. \$1,226 Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300  Hr. \$19,632	mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assun H&S level D.  \$3,257  ECHOS 18 05 0206  \$1,284  ECHOS 17 03 0232; Assumes H&S level C.
Ea. \$1,226 Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300  Hr. \$19,632	mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assun H&S level D.  \$3,257  ECHOS 18 05 0206  \$1,284  ECHOS 17 03 0232; Assumes H&S level C.
Ea. \$1,226 Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300  Hr. \$19,632	mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assun H&S level D.  \$3,257  ECHOS 18 05 0206  \$1,284  ECHOS 17 03 0232; Assumes H&S level C.
Ea. \$1,197  bilization \$3,300  L.F. \$1,284  eparation \$1,300  Hr. \$19,632	mob/demob ECHOS 33 17 0802; Includes water truck; Assun H&S level D. \$3,257  ECHOS 18 05 0206 \$1,284  ECHOS 17 03 0232; Assumes H&S level C.
\$3,300   \$3,300   \$1,284   \$1,300   \$1,300   \$1,632   \$	H&S level D. \$3,257  ECHOS 18 05 0206  \$1,284  ECHOS 17 03 0232; Assumes H&S level C.  ECHOS Crew Code COKBM (Modified); Assum
Eparation \$1,284 Phr. \$19,632	### ECHOS 18 05 0206  \$1,284  ECHOS 17 03 0232; Assumes H&S level C.  ECHOS Crew Code COKBM (Modified); Assum
\$1,300   Hr. \$19,632	\$1,284  ECHOS 17 03 0232; Assumes H&S level C.  ECHOS Crew Code COKBM (Modified); Assum
\$1,300   Hr. \$19,632	\$1,284  ECHOS 17 03 0232; Assumes H&S level C.  ECHOS Crew Code COKBM (Modified); Assum
Hr. \$19,632	ECHOS 17 03 0232; Assumes H&S level C. ECHOS Crew Code COKBM (Modified); Assum
. ,	ECHOS Crew Code COKBM (Modified); Assum
. ,	ECHOS Crew Code COKBM (Modified); Assum
. ,	ECHOS Crew Code COKBM (Modified); Assum
Fr. \$7,008	
	H&S level C.
S.F. \$840	ECHOS 33 08 0585; Assumes H&S level C.
scavation \$27,000	\$27,480
T 04.510	ECHOS 17 02 0222
	ECHOS 17 03 0232
. ,	. , ,
	ECHOS 17 03 0514
<b>, Backfill</b> \$11,000	\$10,671
Acre \$2,519	ECHOS 18 05 0402
storation \$2,500	
. ,	
Ton \$180,000	SHA discussions with Waste Management, Inc.; Includes stabilization additive.
/Disposal \$180,000	\$180,000
ontractor \$230,000	\$225,211
Hr. \$10,890	Assumes 2 weeks of field work; See Note 3.
L.S. \$1,634	Assumes 15% of oversight labor cost.
Hr H	\$27,000   \$27,000     \$27,000     \$4,512     \$4,512     \$1,000     \$11,000     \$180,000   \$2,500   \$180,000   \$180,000   \$230,000   \$10,890   \$1

Subtotal, Engineer

\$13,000

\$12,524

**Detailed Cost Estimate for** 

Date: October 2007 Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

Revision No.: 01 - DRAFT

Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

CRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Laboratory					
Chemical analysis, Soil Management Assessment	5	\$965	Ea.	\$4,825	2006-2007 Fee Schedule, Alpha Woods Hole Labs
		Subtotal, I	aboratory	\$4,800	\$4,825
Subtota	l, Settlin	g Basin #2 l	Excavation	\$240,000	\$242,560
Post-Construction Submittals/As-Builts	1	\$12,000	Ea.	\$12,000	SHA estimate
Su	btotal, (	Construction	n Activities	\$276,000	
Scope Contingency (15% Construction Activities				\$40,000	OSWER 5-6: Assume 15% of Constrcution Activity
Subtotal)					Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$41,000	OSWER 5-6: Assume 15% of Construction Activiti
			_		Subtotal
Subtotal, Construct	ion Acti	vities w/Coi	ntingencies	\$360,000	
Professional/Technical Services					
Remedial Design (15% Construction Activities Subtotal				\$54,000	OSWER 5-8: Assume 15% of Construction Activiti
w/Contingencies)					Subtotal (including contingencies)
Project management (8% Construction Activities				\$29,000	OSWER 5-8: Assume 8% of Construction Activitie
Subtotal w/Contingencies)					Subtotal (including contingencies)
Construction Management (10% Construction Activities				\$36,000	OSWER 5-8: Assume 10% of Construction Activiti
Subtotal w/Contingencies)					Subtotal (including contingencies)
Subtotal, F	rofessio	nal/Technic	al Services	\$120,000	
Institutional Controls					
Establish Deed Restrictions					
Engineer Control of Co	-	Φ. F. C.	-	#15 COO	OTTA C.
Establish Institutional Controls in the form of Deed	3	\$5,000	Ea.	\$15,000	SHA estimate; Costs estimated based on number of
Restrictions		0.1	_		properties requiring deed restrictions.
		Subtota	ıl, Engineer	\$15,000	
Subtot	al, Estab	olish Deed R	Restrictions	\$15,000	
S	Subtotal,	Institutiona	al Controls	\$15,000	

#### ANNUAL O&M COST ELEMENTS

**O&M** Activities

Maintain AOC Cap

Earthwork Contractor (Assume 1 visit annually)

Equipment, Truck 2 Axle, Highway, 33,000 GVW,	1	\$452	Day	\$452	ECHOS 33 01 0111
6x2,2					
Crew, 100 miles, per person	2	\$192	Ea.	\$384	ECHOS 33 01 0204
Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per
					mob/demob.
Subtota	al, Mobiliz	zation/Dem	obilization	\$940	\$940
Subtota	al, Mobiliz	zation/Dem	obilization	\$940	\$940
	al, Mobiliz	zation/Dem	nobilization	\$940	\$940
Repairs to Soil Cap	al, Mobiliz	zation/Dem			\$940  ECHOS Crew Code COBBC; Assumes H&S level
Repairs to Soil Cap Bobcat	,	\$126		\$1,008	
Repairs to Soil Cap Bobcat Topsoil, Furnish & Place, 6" Lifts, Off-site	8	\$126 \$55	Hr.	\$1,008 \$550	ECHOS Crew Code COBBC; Assumes H&S level ECHOS 08 05 0301
Repairs to Soil Cap Bobcat Topsoil, Furnish & Place, 6" Lifts, Off-site Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	8	\$126 \$55	Hr. C.Y.	\$1,008 \$550	ECHOS Crew Code COBBC; Assumes H&S level

TOTAL CAPITAL COSTS

\$500,000

**Detailed Cost Estimate for** 

Date: October 2007 Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

Revision No.: 01 - DRAFT

Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

			UNIT			
RIPTION		QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
	<b>Pavement Restoration</b>					
	Pavement Removal, Bituminous driveway	106	\$5.71	S.Y.	\$606	Means 02 41 13.17 5100; Assumes 5% of paved AOC
						replaced annually.
	Transportation and Disposal, Asphalt	14	\$25	Ton	\$350	SHA discussions with Waste Management, Inc.
	Asphaltic Concrete Pavement, Lots & Driveways,	950	\$2.93	S.F.	\$2,784	Means 32 12 16.14 0020; Assumes 5% of paved AOC
	6" stone base, 2" binder course, 1" topping					replaced annually.
	Hauling, 20 C.Y. dump truck, 20 mile round trip	9	\$14	L.C.Y	\$123	Means 31 23 23.18 1255
		Subtotal,	Pavement	Restoration	\$3,900	\$3,863
		Subtotal	, Earthwork	Contractor	\$6,400	\$6,361
	scaping Contractor (Assume 2 visits annually)					
	Mowing soil capped AOC, 1st event	93		M.S.F.	\$279	Means 32 01 90.19 4160
	Mowing soil capped AOC, 2nd event	93		M.S.F.	\$279	Means 32 01 90.19 4160
	S	Subtotal, L	andscaping	Contractor	\$560	\$558
Engin	neer					
	Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate o
						\$99/hr. See Note 3.
	Misc. Field Expenses (e.g. mileage, personal	1	\$594	L.S.	\$594	Assume 15% of labor cost for quarterly inspections.
	protective equipment, field supplies, telephone, etc.)	)				
	Labor, Annual Summary Report Preparation	22	\$124	Hr.		See Note 3.
	Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of labor cost for report preparation.
			Subtota	l, Engineer	\$7,400	\$7,419
		Subtota	l, Maintain	AOC Cap	\$14,000	\$14,338
		Sub	total, O&M	I Activities	\$14,000	
Scone	e Contingency (15% O&M Subtotal)				\$2,100	OSWER 5-6: Assume 15% of O&M Subtotal
	Contingency (15% O&M Subtotal)					OSWER 5-6: Assume 15% of O&M Subtotal
Dia Ci	Subtotal, Oc	&M Activ	ritios w/Con	tingoncies	\$18,000	OB WER 3-0. Assume 13/0 of Octor Subtotal
	Subtotal, Oc	WIN ACH	ines wicoi	imgeneies	φ10,000	
nfessiona	al/Technical Services					
	ct Management (10% O&M Subtotal				\$1,800	OSWER 5-8: Assume 10% of Annual O&M Subtotal
Proin	ntingencies)				φ1,000	including contingencies
					¢2.700	OSWER 5-8: Assume 15% of Annual O&M Subtotal
w/Con	9 ,					
w/Con Techn	nical Support (15% O&M Subtotal ntingencies)				\$2,700	including contingencies

TOTAL ANNUAL O&M COST \$23,000

#### PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years)

#### Earthwork Contractor

Security Fence Fence, chain link industrial, schedule 40, 2"	228	\$36	L.F.	\$8,208	Means 32 31 13.20 0500; Assumes 10% of security
posts @ 10' O.C., set in concrete, 6' H, 3 strands					fence is repaired every 5 years.
barb wire, 6 ga. wire, galv. steel					
S	ubtotal, l	Earthwork (	Contractor	\$8,200	\$8,208
Subtotal, Maintain	C	. Famos (ama	<i>5</i> )	\$8.200	\$8,208

**Detailed Cost Estimate for** 

Date: October 2007 Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

Revision No.: 01 - DRAFT

Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

UNIT

DESCRIPTION COSTS COMMENTS/REFERENCE UNITS COST

Subtotal, Every 5 Years O&M Activities \$8,200

Scope Contingency (15% Every 5 Years O&M Activities \$1,200 OSWER 5-6: Assume 15% of Every 5 Years O&M Subtotal) Activities Subtotal Bid Contingency (15% Every 5 Years O&M Activities \$1,200 OSWER 5-6: Assume 15% of Every 5 Years O&M Subtotal) Activities Subtotal

> Subtotal, Every 5 Years O&M Activities w/Contingencies \$11,000

> > Subtotal, Construction/O&M Activities \$11,000

**Professional/Technical Services** 

Project Management (10% Construction/O&M \$1,100 OSWER 5-8: Assume 10% of Construction/O&M Activities Subtotal w/Contingencies) Activities Subtotal including contingencies Technical Support (15% Construction/O&M Activities \$1,700 OSWER 5-8: Assume 15% of Construction/O&M Subtotal w/Contingencies) Activities Subtotal including contingencies

#### Five-Year Review

Engineer

Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of
					\$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone,	1	\$620	L.S.	\$620	Assume 5% of labor costs.
postage, etc.)					
		Subtotal	, Engineer	\$13,000	\$13,020

Subtotal, Five Year Review

\$13,000

Subtotal, Professional/Technical Services \$16,000

> TOTAL PERIODIC COSTS \$27,000

Abbreviations:

B.C.Y. = bank cubic yards L.S. = lump sumpS.F. = square feetHr. = hour C.Y. = cubic yardsL.C.Y. = loose cubic yards Mo. = monthS.Y. = square yard

Ea. = each L.F. = linear feet M.S.F. = thousand square feet

#### Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.

RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.

ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the quantity estimates associated with excavation remedial process options:
  - a.) We assumed "swell" factor of 18% for excavated soils.
  - b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number in presented italics to the right of rounded subtotals is the unrounded summed value.

## Appendix D-3c

**Cost Estimates for Alternative AOC-4** 

Revision No.: 01 - DRAFT

Date: October 2007

**Cost Estimate Summary for** 

### Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell,

#### Removal of Culvert, Off-Site Disposal

#### **Feasibility Study**

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### **CAPITAL COSTS**

PITAL COSTS	
Construction Activities	
Implementation Plans/Submittals	\$200,000
AOC Excavation	
Contractor	
Mobilization/Demobilization	\$6,900
Site Preparation	\$68,000
Excavation, Soil-Covered AOC	\$730,000
Excavation, Paved AOC	\$32,000
Backfill	\$670,000
Site Restoration	\$66,000
Soil Stabilization	\$620,000
Transportation/Disposal	\$4,700,000
Subtotal, Contractor	\$6,900,000
Engineer	\$285,000
Laboratory	\$110,000
Subtotal, AOC Excavation	\$7,300,000
Settling Basing #2 Excavation	
Contractor	
Mobilization/Demobilization	\$3,300
Site Preparation	\$1,300
Excavation	\$27,000
Backfill	\$11,000
Site Restoration	\$2,500
Transportation/Disposal	\$180,000
Subtotal, Contractor	\$230,000
Engineer	\$13,000
Laboratory	\$4,800
Subtotal, Settling Basin #2 Excavation	\$240,000
Post-Construction Submittals/As-builts	\$100,000
Subtotal, Construction Activities	\$7,840,000
Scope Contingency (15% of Construction Activities Subtotal)	\$1,200,000
Bid Contingency (15% of Construction Activities Subtotal)	\$1,200,000
Subtotal, Construction Activities w/Contingencies	\$10,000,000

Revision No.: 01 - DRAFT

Date: October 2007

**Cost Estimate Summary for** 

Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

Professional/Technical Services	
Remedial Design (8% Construction Activities Subtotal w/Contingencies)	\$800,000
Project management (5% Construction Activities Subtotal w/Contingencies)	\$500,000
Construction Management (6% Construction Activities Subtotal w/Contingencies)	\$600,000
Subtotal, Professional/Technical Services	\$1,900,000
Institutional Controls	
Establish Deed Restrictions	\$15,000
Subtotal, Institutional Controls	\$15,000
TOTAL CAPITAL COSTS	\$12,000,000
ANNUAL O&M COSTS	
O&M Activities	
Maintain AOC Cap	
Earthwork Contractor (Assume 1 visit annually)	
Mobilization/Demobilization	\$940
Repairs to Soil Cap	\$1,600
Pavement Restoration	\$3,900
Subtotal, Earthwork Contractor	\$6,400
Landscaping Contractor (Assume 2 visits annually)	\$560
Engineer	\$7,400
Subtotal, Maintain AOC Cap	\$14,000
Subtotal, O&M Activities	\$14,000
Scope Contingency (15% Annual O&M Activities Subtotal)	\$2,100
Bid Contingency (15% Annual O&M Activities Subtotal)	\$2,100
Subtotal, O&M Activities w/Contingencies	\$18,000
Professional/Technical Services	
Project Management (10% Annual O&M Activities Subtotal w/Contingencies)	\$1,800
Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)	\$2,700
Subtotal, Professional/Technical Services	\$4,500
TOTAL ANNUAL O&M COST	\$23,000

Cost Estimate Summary for Date: October 2007

Revision No.: 01 - DRAFT

#### Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell,

### Removal of Culvert, Off-Site Disposal

Walpole, Massachusetts

#### Feasibility Study Blackburn & Union Privileges Superfund Site

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#### PERIODIC COSTS

Construction/O&M Activities	
Every 5 Years O&M Activities	
Maintain Security Fence (every 5 years)	\$8,200
Subtotal, Every 5 Years O&M Activities	\$8,200
Scope Contingency (15% Every 5 Years O&M Activities Subtotal)	\$1,200
Bid Contingency (15% Every 5 Years O&M Activities Subtotal)	\$1,200
Subtotal, Every 5 Years O&M Activities w/Contingencies	\$11,000
Subtotal, Construction/O&M Activities	\$11,000

#### **Professional/Technical Services**

Subtotal, Professional/Technical Services	\$15,000 \$16,000
Five-Year Review	\$13,000
Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies)	\$1,700
Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)	\$1,100

TOTAL PERIODIC COSTS \$27,000

Revision No.: 01 - DRAFT **Cost Estimate Summary for** Date: October 2007

#### Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal **Feasibility Study**

#### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	<u>Total Cost</u>	Total Cost Per Year	<u>Discount</u> <u>Factor</u>	Present Value
Capital Costs	0	\$12,000,000	\$12,000,000	1	\$12,000,000
Annual O&M Costs	1-100	\$2,300,000	\$23,000	14.3	\$330,000
Periodic Costs	5	\$27,000	\$27,000	0.713	\$19,000
Periodic Costs	10	\$27,000	\$27,000	0.508	\$14,000
Periodic Costs	15	\$27,000	\$27,000	0.362	\$9,800
Periodic Costs	20	\$27,000	\$27,000	0.258	\$7,000
Periodic Costs	25	\$27,000	\$27,000	0.184	\$5,000
Periodic Costs	30	\$27,000	\$27,000	0.131	\$3,500
Periodic Costs	35	\$27,000	\$27,000	0.0937	\$2,500
Periodic Costs	40	\$27,000	\$27,000	0.0668	\$1,800
Periodic Costs	45	\$27,000	\$27,000	0.0476	\$1,300
Periodic Costs	50	\$27,000	\$27,000	0.0339	\$920
Periodic Costs	55	\$27,000	\$27,000	0.0242	\$650
Periodic Costs	60	\$27,000	\$27,000	0.0173	\$470
Periodic Costs	65	\$27,000	\$27,000	0.0123	\$330
Periodic Costs	70	\$27,000	\$27,000	0.00877	\$240
Periodic Costs	75	\$27,000	\$27,000	0.00625	\$170
Periodic Costs	80	\$27,000	\$27,000	0.00446	\$120
Periodic Costs	85	\$27,000	\$27,000	0.00318	\$86
Periodic Costs	90	\$27,000	\$27,000	0.00227	\$61
Periodic Costs	95	\$27,000	\$27,000	0.00162	\$44
Periodic Costs	100	\$27,000	\$27,000	0.00115	\$31

#### TOTAL PRESENT VALUE OF ALTERNATIVE

\$12,000,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

Revision No.: 01 - DRAFT **Detailed Cost Estimate for** Date: October 2007 Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

> Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal	l
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		UNIT			
ΓΙΟΝ	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
COST ELEMENTS					
truction Activities					
Implementation Plans/Submittals	1	\$200,000	Ea.	\$200,000	SHA estimate
AOC Excavation					
Contractor					
Mobilization/Demobilization					
Compacter, 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob
Excavator, Loader, Above 150 HP	6	\$613	Ea.	\$3,678	Means 01 54 36.50 0100; Assumes 50 miles per
					mob/demob
Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	5	\$399			ECHOS 33 17 0802; Includes water truck; Assume
Becontainmate Medium Equipment		ΨΟΟΟ	Lu.	Ψ1,,,,	level D.
Subtot	al Mabili	zation/Dem		\$6,900	\$6,915
Subtota	ai, Modii	zation/Dem	obilization	\$0,200	φ0,913
Cita Danamantian					
Site Preparation Pavement removal, Bituminous driveways	2 112	\$9.25	c v	¢10.526	Means 02 41 13.17 5100; Assumes H&S level C.
	2,112				·
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5'	800	\$4.28	L.F.	\$3,424	ECHOS 18 05 0206
posts	2 000		a =	# 1 <b>#</b> 000	0.77
Sheet Pile River upstream and downstream	3,000		S.F.		SHA estimate, based on experience.
	Sub	total, Site P	reparation	\$68,000	\$67,960
Excavation, Soil-Covered AOC					
Strip Soil Cap and Stockpile, 2 C.Y. Hydraulic	6,600	\$7.66	C.Y.	\$50,556	ECHOS 17 03 0277; Includes truck loading; Assur
Excavator, Medium Material					H&S level C.
Excavate AOC Soil, 2 C.Y. Hydraulic Excavator,	35,000	\$7.66	C.Y.	\$268,100	ECHOS 17 03 0277; Includes truck loading; Assur
Medium Material					H&S level C.
Two, 10-wheel Dump Trucks	35	\$903	Day	\$31,605	ECHOS 33 01 0111; Assumes H&S level C.
950, 3.0 CY, Wheel Loader	277	\$212	-		ECHOS 17 03 0223; Assumes H&S level C.
Bobcat	277	\$180			ECHOS Crew Code COBBC; Assumes H&S level
Boocat	211	\$160	пі.	\$49,920	ECHOS CIEW Code COBBC, Assumes has level
Water Truck	48	\$146	Hr.	\$7,008	ECHOS Crew Code COKBM (Modified); Assume
					level C.
Sprayed Water Dust Suppressant	93,000	\$0.06	S.F.	\$5.580	ECHOS 33 08 0585; Assumes H&S level C.
Demolition of Arch Culvert	400		L.F.		Means 02 41 13.40 0200; Assumes H&S level D.
First River Dewatering Pump	146		8-hr Shift		Means 31 23 19.20 1100
Second and Third Pump	146		8-hr Shift		Means 31 23 19.20 1100
Additional Pump Discharge Hose; 400 ft ea.			L.F.		
	1,200				SHA estimate, based on experience.
10,000 gal Fractionation Tank (coated interior)	3		Week		Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	3		Week		Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	3		Week		Rain for Rent, Inc. Quote dated 09/24/07
Filtration system, 4-stage tandem unit, 200 gpm	1	\$2,800	Month	\$2,800	SHA discussions with N.E. Environmental Solution
Filtration system hoses	1	\$400	Month	\$400	SHA discussions with N.E. Environmental Solution
Filtration system pumps, 2" submersibles	1	\$800	Month	\$800	SHA discussions with N.E. Environmental Solutio
Filters	120	\$8.00	Ea.	\$960	SHA discussions with N.E. Environmental Solutio
6,34,43,19		of Soil-Cov	TOTA Lorent	\$730,000	\$734.360
Subtotal, E	acavauon	1 01 2011-C0V	ereu AUC	φ/30,000	\$734,360
Excavation, Paved AOC					
Excavate & Load, 2 C.Y. Hydraulic Excavator,	2,500	\$7.66	C.Y.	\$19,150	ECHOS 17 03 0277; Includes truck loading; Assur
Medium Material					H&S level C.
950, 3.0 CY, Wheel Loader	33	\$212	Hr.	\$7,067	ECHOS 17 03 0223; Assumes H&S level C.
Water Truck	33	\$146			ECHOS Crew Code COKBM (Modified); Assume
				+ .,- 10	level C.

Sprayed Water Dust Suppressant

Subtotal, Excavation of Paved AOC

\$0.06 S.F.

\$1,136 ECHOS 33 08 0585; Assumes H&S level C.

\$32,171

\$32,000

19,000

**Detailed Cost Estimate for** Date: October 2007 Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

Revision No.: 01 - DRAFT

Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

		UNIT			
TION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Backfill Retaining Wall, Stone gabion, 100 feet long, ave. 8 feet high	89	\$269	C.Y.	\$23,911	Means 32 32 36.10 6020
Unclassified Fill, 6" Lifts, Off-site, Includes Delivery, Spreading, Compaction	24,578	\$19	C.Y.	\$466,978	ECHOS 17 03 0423
Gravel Fill, 6" Lifts	300		C.Y.	\$6,900	ECHOS 17 03 0430
Hauling, 20 C.Y. Sump Trailer, 20 mile rt	300		C.Y.	\$4,200	Means 31 23 23.18 1255
Backfill with Stockpiled Material	6,600	\$4.00			ECHOS 17 03 0401
Compact Backfill, by Machine, Sheepsfoot Roller, 6" Lift	32,900	\$1.31	C.Y.	\$43,099	ECHOS 17 03 0514
Topsoil, Furnish & Place, 6" Lifts, Off-site	1,722	\$55	C.Y.	\$94,722	ECHOS 18 05 0301
		Subtota	al, Backfill	\$670,000	\$666,210
Site Restoration			I I		T
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	19,000	\$2.93	S.F.	\$55,670	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	581	\$14	L.C.Y	\$8.128	Means 31 23 23.18 1255
Hydroseeding	2	\$1,155			ECHOS 18 05 0401
	Sub	total, Site-R		\$66,000	\$66,264
Soil Stabilization		·			
In-Situ Cement Stabilization, 6%	18,333	\$34	B.C.Y.	\$623,333	ECHOS 17 03 0602; Assumes H&S level C.
	Subt	otal, Soil St	abilization	\$620,000	\$623,333
Transportation/Disposal					
Asphalt	264		Ton		SHA discussions with Waste Management, Inc.
Water, Non-Hazardous	315,000	\$0.20	Gal.	\$63,000	SHA discussions with N.E. Environmental Solution
Asbestos-Impacted Soils, Non-Hazardous	57,900	\$80	Ton	\$4,632,000	SHA discussions with Waste Management, Inc.
Su	ıbtotal, Tr	ansportatio	-	\$4,700,000	\$4,701,597
		Subtotal, (	ontractor	<b>#</b> < 000 000	\$6,898,810
		Subtotal,	Jointi actor	\$6,900,000	+-,
		Subtotal, C	contractor	\$6,900,000	++,-,-,-
Engineer	2.500				
Engineer  Labor, Oversight	2,500	\$99		\$247,500	Although actual project timeline is to be determined
	1		Hr.	\$247,500	Although actual project timeline is to be determined assume 12 months of engineers oversight will be rec
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal	1	\$99 \$37,125	Hr.	\$247,500	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$99 \$37,125	Hr.	\$247,500 \$37,125	Although actual project timeline is to be determined assume 12 months of engineers oversight will be recessee Note 3.  Assume 15% of oversight labor cost.
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory	1	\$99 \$37,125 <b>Subtotal</b>	Hr. L.S.	\$247,500 \$37,125 \$285,000	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment	1	\$99 \$37,125	Hr. L.S.	\$247,500 \$37,125 \$285,000	Although actual project timeline is to be determined assume 12 months of engineers oversight will be recessee Note 3.  Assume 15% of oversight labor cost.
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory	1	\$99 \$37,125 <b>Subtotal</b> \$965	Hr. L.S. , Engineer	\$247,500 \$37,125 \$285,000 \$111,940	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment	1	\$99 \$37,125 <b>Subtotal</b>	Hr. L.S. , Engineer	\$247,500 \$37,125 \$285,000	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. Assume 15% of oversight labor cost.  \$284,625
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment	116	\$99 \$37,125 <b>Subtotal</b> \$965	Hr. L.S. , Engineer Ea.	\$247,500 \$37,125 \$285,000 \$111,940	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment	116	\$99 \$37,125 <b>Subtotal</b> \$965 <b>Subtotal, L</b>	Hr. L.S. , Engineer Ea.	\$247,500 \$37,125 \$285,000 \$111,940	Although actual project timeline is to be determined assume 12 months of engineers oversight will be red See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I	116	\$99 \$37,125 <b>Subtotal</b> \$965 <b>Subtotal, L</b>	Hr. L.S. , Engineer Ea.	\$247,500 \$37,125 \$285,000 \$111,940	Although actual project timeline is to be determined assume 12 months of engineers oversight will be red See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I	116	\$99 \$37,125 <b>Subtotal</b> \$965 <b>Subtotal, L</b>	Hr. L.S. , Engineer Ea.	\$247,500 \$37,125 \$285,000 \$111,940	Although actual project timeline is to be determined assume 12 months of engineers oversight will be red See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization	116	\$99 \$37,125 <b>Subtotal</b> \$965 <b>Subtotal, L</b>	Hr. L.S. , Engineer Ea.	\$247,500 \$37,125 \$285,000 \$111,940	Although actual project timeline is to be determined assume 12 months of engineers oversight will be red See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor	116	\$99 \$37,125 <b>Subtotal</b> \$965 <b>Subtotal, L</b>	Hr.  L.S. , Engineer  Eaaboratory	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP	116 Subt	\$99 \$37,125 Subtotal \$965 Subtotal, L otal, AOC I	Hr.  L.S. , Engineer  Eaaboratory  Excavation	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization	116 Subt	\$99 \$37,125 Subtotal \$965 Subtotal, L	Hr.  L.S. , Engineer  Eaaboratory  Excavation	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP  Excavator Above 150 HP	116 Subt	\$99 \$37,125  Subtotal \$965  Subtotal, L otal, AOC I	Hr.  L.S.  Fingineer  Ea.  Eacavation  Ea.  Ea.	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000 \$834 \$1,226	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP	116 Subt	\$99 \$37,125 Subtotal \$965 Subtotal, L otal, AOC I	Hr.  L.S.  Fingineer  Ea.  Eacavation  Ea.  Ea.	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000 \$834 \$1,226	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assumes
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP  Excavator Above 150 HP  Decontaminate Medium Equipment	116 Subt	\$99 \$37,125  Subtotal \$965  Subtotal, L otal, AOC I \$417 \$613 \$399	Hr.  L.S.  Fagineer  Ea.  Excavation  Ea.  Ea.  Ea.	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000 \$834 \$1,226 \$1,197	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assumes level D.
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP  Excavator Above 150 HP  Decontaminate Medium Equipment	116 Subt	\$99 \$37,125  Subtotal \$965  Subtotal, L otal, AOC I	Hr.  L.S.  Fagineer  Ea.  Excavation  Ea.  Ea.  Ea.	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000 \$834 \$1,226	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assumes
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP  Excavator Above 150 HP  Decontaminate Medium Equipment	116 Subt	\$99 \$37,125  Subtotal \$965  Subtotal, L otal, AOC I \$417 \$613 \$399	Hr.  L.S.  Fagineer  Ea.  Excavation  Ea.  Ea.  Ea.	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000 \$834 \$1,226 \$1,197	Although actual project timeline is to be determined assume 12 months of engineers oversight will be received. See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assumes level D.
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP  Excavator Above 150 HP  Decontaminate Medium Equipment  Subtot	116 Subt	\$99  \$37,125  Subtotal  \$965  Subtotal, L  otal, AOC I  \$417  \$613  \$399  zation/Demo	Hr.  L.S.  Fangineer  Ea.  Excavation  Ea.  Ea.  Ea.  Obilization	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000 \$1,300,000 \$1,197 \$3,300	Although actual project timeline is to be determined assume 12 months of engineers oversight will be required See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assumes level D.  \$3,257
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP  Excavator Above 150 HP  Decontaminate Medium Equipment  Subtot  Site Preparation  Erosion Control, Silt Fences, Vinyl, 3' high with 7.5'	116 Subt	\$99 \$37,125  Subtotal \$965  Subtotal, L otal, AOC I \$417 \$613 \$399	Hr.  L.S.  Fangineer  Ea.  Excavation  Ea.  Ea.  Ea.  Obilization	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000 \$1,300,000 \$1,197 \$3,300	Although actual project timeline is to be determined assume 12 months of engineers oversight will be red See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assumes level D.
Labor, Oversight  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment Package I  Settling Basing #2 Excavation  Contractor  Mobilization/Demobilization  Compactor, 70 to 150 HP  Excavator Above 150 HP  Decontaminate Medium Equipment  Subtot	116 Subt	\$99  \$37,125  Subtotal  \$965  Subtotal, L  otal, AOC I  \$417  \$613  \$399  zation/Demo	Hr.  L.S.  Fangineer  Ea.  Excavation  Ea.  Ea.  Ea.  Obilization	\$247,500 \$37,125 \$285,000 \$111,940 \$110,000 \$7,300,000 \$1,300,000 \$1,197 \$3,300	Although actual project timeline is to be determined assume 12 months of engineers oversight will be red See Note 3.  Assume 15% of oversight labor cost.  \$284,625  2006-2007 Fee Schedule, Alpha Woods Hole Labs  \$111,940  \$7,295,375  Means 01 54 36.50 0020; assumes 50 miles per mob/demob  Means 01 54 36.50 0100; assumes 50 miles per mob/demob  ECHOS 33 17 0802; Includes water truck; Assumes level D.  \$3,257

Subtotal, Site Preparation

\$1,300

\$1,284

Detailed Cost Estimate for Date: October 2007
Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

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Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

CRIPTION	ī	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
	Excavation					
	Crawler-mounted, 2.0 C.Y. 235 Hydraulic Excavator	48	\$409	Hr.	\$19,632	ECHOS 17 03 0232; Assumes H&S level C.
	Water Truck	48	\$146	Hr.	\$7,008	ECHOS Crew Code COKBM (Modified); Assumes H& level C.
	Sprayed Water Dust Suppressant	14,000	\$0.06	S.F.	\$840	ECHOS 33 08 0585; Assumes H&S level C.
	T	,	Subtotal, E		\$27,000	\$27,480
	Backfill					
	Crawler-mounted, 2.0 C.Y. 235 Hydraulic Excavator	16	\$282	Hr.	\$4,512	ECHOS 17 03 0232
	Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	16	\$344	Hr.	\$5,504	ECHOS Crew Code COFCQ (Modified)
	Compact Backfill, by Machine, Sheepsfoot Roller, 6" Lift	500	\$1.31	C.Y.	\$655	ECHOS 17 03 0514
			Subtota	l, Backfill	\$11,000	\$10,671
	Site Restoration					
	Seeding, Vegetative Cover	0.33	\$7,632			ECHOS 18 05 0402
		Sub	total, Site-R	estoration	\$2,500	\$2,519
	Transportation/Disposal					
	Asbestos-Impacted Soils, Non-Hazardous	2,250	\$80	Ton	\$180,000	SHA discussions with Waste Management, Inc.; Include stabilization additive.
	Su	btotal, Tr	ansportation	ı/Disposal	\$180,000	\$180,000
		,	Subtotal, C	_	\$230,000	\$225,211
			Subtotal, C	oner actor	Ψ250,000	Ψ223,211
Engi	ineer					
	Labor, Oversight	110	\$99		\$10,890	Assumes 2 weeks of field work; See Note 3.
	Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	L.S.	\$1,634	Assumes 15% of oversight labor cost.
			Subtotal,	Engineer	\$13,000	\$12,524
Laha	pratory					
Luve	Chemical analysis, Soil Management Assessment	5	\$965	Ea.	\$4.825	2006-2007 Fee Schedule, Alpha Woods Hole Labs
		-	Subtotal, L		\$4,800	\$4,825
	Subtot	al, Settling	g Basin #2 E	xcavation	\$240,000	\$242,560
Post	-Construction Submittals/As-builts	1	\$100,000	Ea.	\$100,000	SHA estimate
	S	Subtotal, C	Construction	Activities	\$7,840,000	
Scop Subt	e Commigency (13/0 of Construction Activities				\$1,200,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid (	Contingency (15% of Construction Activities total)				\$1,200,000	OSWER 5-6: Assume 15% of Construction ActivitiesSubtotal
~	Subtotal, Constru	ction Activ	vities w/Con	tingencies	\$10,000,000	
	2 - 2 - 2 - 2 - 3 - 3 - 3 - 3 - 3 - 3 -			6:	,,	
	nal/Technical Services					
	edial Design (8% Construction Activities Subtotal ontingencies)				\$800,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
	ect management (5% Construction Activities				\$500,000	OSWER 5-8: Assume 5% of Construction Activities
	total w/Contingencies)					Subtotal including contingencies
Subt Cons	otal w/Contingencies) struction Management (6% Construction Activities total w/Contingencies)				\$600,000	Subtotal including contingencies  OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies

**Detailed Cost Estimate for** Date: October 2007 Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

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Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-	Site Disposal
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UNIT

DESCRIPTION QTY COSTS UNITS COST COMMENTS/REFERENCE

**Institutional Controls** 

**Establish Deed Restrictions** 

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Establish Institutional Controls in the form of Deed	3	\$5,000 Ea.	\$15,000	SHA estimate; Costs estimated based on number of
Restrictions				properties requiring deed restrictions.
		Subtotal Engineer	\$15,000	

Subtotal, Engineer

**Subtotal, Establish Deed Restrictions** \$15,000

> **Subtotal, Institutional Controls** \$15,000

TOTAL CAPITAL COSTS \$12,000,000

#### ANNUAL O&M COST ELEMENTS

O&M Activities

**Maintain AOC Cap** 

#### Earthwork Contractor (Assume 1 visit annually)

Mobilization/Demobilization					T
Equipment, Truck 2 Axle, Highway, 33,000 GVW, 6x2,2	1	\$452	Day	\$452	ECHOS 33 01 0111
Crew, 100 miles, per person	2	\$192	Ea.	\$384	ECHOS 33 01 0204
Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per
* *					mob/demob.
Subtota	al, Mobiliz	zation/Dem	obilization	\$940	\$940
Repairs to Soil Cap					
Bobcat	8	\$126	Hr.	\$1,008	ECHOS Crew Code COBBC; Assumes H&S level D.
Topsoil, Furnish & Place, 6" Lifts, Off-site	10	\$55	C.Y.	\$550	ECHOS 08 05 0301
Mechanical Seeding, Grass seed hand push	1	\$27	M.S.F.	\$27	Means 32 92 19.13 0800; Assumes 5% of soil capped
spreader, 4.5 lbs per M.S.F.					AOC is re-seeded annually.
	Subtota	ıl, Repairs t	to Soil Cap	\$1,600	\$1,558
Pavement Restoration					
Pavement Removal, Bituminous driveway	106	\$5.71	S.Y.	\$606	Means 02 41 13.17 5100; Assumes 5% of paved AOC
,					replaced annually.
Transportation and Disposal, Asphalt	14	\$25	Ton	\$350	SHA discussions with Waste Management, Inc.
Asphaltic Concrete Pavement, Lots & Driveways,	950	\$2.93	S.F.		Means 32 12 16.14 0020; Assumes 5% of paved AOC
6" stone base, 2" binder course, 1" topping					replaced annually.
Hauling, 20 C.Y. dump truck, 20 mile round trip	9	\$14	L.C.Y	\$123	Means 31 23 23.18 1255
S	Subtotal, I	Pavement F	Restoration	\$3,900	\$3,863
S	ubtotal, E	Carthwork (	Contractor	\$6,400	\$6,361
ndscaping Contractor (Assume 2 visits annually)					
Mowing soil capped AOC, 1st event	93	\$3.00	M.S.F.	\$279	Means 32 01 90.19 4160
Mowing soil capped AOC, 2nd event	93	\$3.00	M.S.F.	\$279	Means 32 01 90.19 4160
Sul	ototal, La	ndscaping (	Contractor	\$560	\$558
ngineer					
Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal	1	\$594	L.S.	\$594	Assume 15% of labor cost for quarterly inspections.
protective equipment, field supplies, telephone, etc.)					, , , , , , , ,
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of labor cost for report preparation.
1 ' ' I ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '		0.1441	<del>-</del>	Φ7. 400	ф7. 410

Subtotal, Maintain AOC Cap \$14,000 \$14,338

\$7,400

\$7,419

Subtotal, Engineer

**Detailed Cost Estimate for** Date: October 2007 Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

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#### AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

		UNIT			
SCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
	Su	btotal, O&M	I Activities	\$14,000	
Scope Contingency (15% Annual O&M Activities				\$2,100	OSWER 5-6: Assume 15% of Annual O&M Activities
Subtotal)					Subtotal
Bid Contingency (15% Annual O&M Activities				\$2,100	OSWER 5-6: Assume 15% of Annual O&M Activities
Subtotal)					Subtotal
Subtotal	O&M Act	ivities w/Cor	ntingencies	\$18,000	-
D. C. ada an I/T. ada da ad C. ada an					
Professional/Technical Services				¢1 000	OCMED 5 0 A 100/ CA 100 M A C C
Project Management (10% Annual O&M Activities				\$1,800	
Subtotal w/Contingencies)					Subtotal including contingencies
Technical Support (15% Annual O&M Activities				\$2,700	OSWER 5-8: Assume 15% of Annual O&M Activities
					Subtotal including contingencies
Subtotal w/Contingencies)					Subtotal including contingencies

\$23,000

TOTAL ANNUAL O&M COST

#### PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years)

Earthwork	k Conti	ractor
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Security Fence						
Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	228	\$36	L.F.	\$8,208	Means 32 31 13.20 0500; Assumes 10% of security fencis repaired every 5 years.	
	Subtotal, I	Earthwork (	Contractor	\$8,200	\$8,208	
Subtotal, Maintai	Subtotal, Maintain Security Fence (every 5 years)					
Subtotal	, Every 5	Years O&M	I Activities	\$8,200		
Scope Contingency (15% Every 5 Years O&M Activities Subtotal)				\$1,200	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal	
Bid Contingency (15% Every 5 Years O&M Activities Subtotal)				\$1,200	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal	
Subtotal, Every 5 Years (	)&M Acti	vities w/Coi	ntingencies	\$11,000		
Subtota	ıl, Constru	ction/O&N	I Activities	\$11,000		

Detailed Cost Estimate for Date: October 2007 Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

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Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

#### AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Culvert, Off-Site Disposal

IPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
rofessional/Technical Services					
Project Management (10% Construction/O&M				\$1,100	OSWER 5-8: Assume 10% of Construction/O&M
Activities Subtotal w/Contingencies)					Activities Subtotal including contingencies
Technical Support (15% Construction/O&M Activities				\$1,700	OSWER 5-8: Assume 15% of Construction/O&M
Subtotal w/Contingencies)					Activities Subtotal including contingencies

#### Five-Year Review

Engineer

0					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of
					\$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone,	1	\$620	L.S.	\$620	Assume 5% of labor costs.
postage, etc.)					
		Subtotal	, Engineer	\$13,000	\$13,020

Subtotal, Five-Year Review \$13,000 \$13,020

Subtotal, Professional/Technical Services \$16,000

TOTAL PERIODIC COSTS \$27,000

Abbreviations:

DESCRI Pro

 $B.C.Y. = bank \ cubic \ yards \qquad Hr. = hour \qquad L.S. = lump \ sump \qquad S.F. = square \ feet \\ C.Y. = cubic \ yards \qquad L.C.Y. = loose \ cubic \ yards \qquad Mo. = month \qquad S.Y. = square \ yard$ 

 $Ea. = each \hspace{1cm} L.F. = linear feet \hspace{1cm} M.S.F. = thousand square feet \\$ 

#### Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.

RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.

ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the quantity estimates associated with excavation remedial process options:
  - a.) We assumed "swell" factor of 18% for excavated soils.
- b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number in presented italics to the right of rounded subtotals is the unrounded summed value.

# APPENDIX D-4 SSW ALTERNATIVE COST ESTIMATES

## Appendix D-4a

**Cost Estimates for Alternative SSW-2** 

# Cost Estimate Summary for Alternative SSW-2: Limited Action

### **Feasibility Study**

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

CAPITAL COSTS	
Construction Activities	
Implementation Plans/Submtitals	\$13,000
Install Security Fence	
Contractor	\$130,000
Subtotal, Install Security Fence	\$130,000
Post-Construction Submittals/As-Builts	\$6,500
Subtotal, Construction Activities	\$149,500
Scope Contingency (15% Construction Activities Subtotal)	\$22,000
Bid Contingency (15% Construction Activities Subtotal)	\$22,000
Subtotal, Construction Activities with Contingencies	\$190,000
Professional/Technical Services	
Project Management (8% Construction Activities Subtotal w/Contingencies)	\$15,000
Remedial Design (15% Construction Activities Subtotal w/Contingencies)	\$29,000
Construction Management (10% Construction Activities Subtotal w/Contingencies)	\$19,000
Subtotal, Professional/Technical Services	\$63,000
Institutional Controls	
Establish Deed Restrictions	\$55,000
Subtotal, Establish Institutional Controls	\$55,000
TOTAL, CAPITAL COSTS	\$310,000
ANNUAL O&M COSTS	
O&M Activities	
Quarterly Inspections	\$7,400
Subtotal, O&M Activitites	\$7,400
Scope Contingency (15% O&M Activities Subtotal)	\$1,100
Bid Contingency (15% O&M Activities Subtotal)	\$1,100
Subtotal, O&M Activities with Contingencies	\$10,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$1,000
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,500
Subtotal, Professional/Technical Services	\$2,500

TOTAL, ANNUAL O&M COSTS

\$13,000

### **Cost Estimate Summary for Alternative SSW-2: Limited Action**

### **Feasibility Study**

### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

### PERIODIC COSTS

### Construction/O&M Activities

Every 5 Years O&M Activities Maintain Existing Security Fencing (every 5 years)

\$12,000

Subtotal, Every 5 Years O&M Activities \$12,000 Scope Contingency (15% of Every 5 Years O&M Activities Subtotal) \$1,800 Bid Contingency (15% of Every 5 Years O&M Activities Subtotal) \$1,800

Subtotal, Construction Activities with Contingencies

\$16,000

### **Professional/Technical Services**

Project Management (10% of Every 5 Years O&M Activities Subtotal w/Contingencies) \$1,600 Technical Support (15% of Every 5 Years O&M Activities Subtotal w/Contingencies) \$2,400 Five-Year Review \$13,000

Subtotal, Professional/Technical Services

\$17,000

### TOTAL, PERIODIC COSTS

\$33,000

### PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	Total Cost	Total Cost Per Year	<u>Discount</u> <u>Factor</u>	Present Value
Capital Costs	0	\$310,000	\$310,000	1	\$310,000
Annual O&M Costs	1-100	\$1,300,000	\$13,000	14.3	\$190,000
Periodic Costs	5	\$33,000	\$33,000	0.713	\$24,000
Periodic Costs	10	\$33,000	\$33,000	0.508	\$17,000
Periodic Costs	15	\$33,000	\$33,000	0.362	\$12,000
Periodic Costs	20	\$33,000	\$33,000	0.258	\$8,500
Periodic Costs	25	\$33,000	\$33,000	0.184	\$6,100
Periodic Costs	30	\$33,000	\$33,000	0.131	\$4,300
Periodic Costs	35	\$33,000	\$33,000	0.0937	\$3,100
Periodic Costs	40	\$33,000	\$33,000	0.0668	\$2,200
Periodic Costs	45	\$33,000	\$33,000	0.0476	\$1,600
Periodic Costs	50	\$33,000	\$33,000	0.0339	\$1,100
Periodic Costs	55	\$33,000	\$33,000	0.0242	\$800
Periodic Costs	60	\$33,000	\$33,000	0.0173	\$570
Periodic Costs	65	\$33,000	\$33,000	0.0123	\$410
Periodic Costs	70	\$33,000	\$33,000	0.00877	\$290
Periodic Costs	75	\$33,000	\$33,000	0.00625	\$210
Periodic Costs	80	\$33,000	\$33,000	0.00446	\$150
Periodic Costs	85	\$33,000	\$33,000	0.00318	\$100
Periodic Costs	90	\$33,000	\$33,000	0.00227	\$75
Periodic Costs	95	\$33,000	\$33,000	0.00162	\$53
Periodic Costs	100	\$33,000	\$33,000	0.00115	\$38

### TOTAL PRESENT VALUE OF ALTERNATIVE

\$580,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

### TABLE D-4a.2 **Detailed Cost Estimate for** Alternative SSW-2: Limited Action

Revision No.: 01 - DRAFT

Date: October 2007

### Feasibility Study Blackburn & Union Privileges Superfund Site

UNIT

Walpole, Massachusetts

SSW-2: Limited Action

		UNIT			
CRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
ITAL COSTS					
Construction Activities		#12.000	_	443.000	G***
Implementation Plans/Submtitals	1	\$13,000	Ea.	\$13,000	SHA estimate
Install Security Fence					
Contractor					
Clearing, Medium Brush with Average Grub & Some Trees	1.0	\$1,254	Acre	\$1,254	ECHOS 17 01 0103; Assumes distance of 1,700 fe 10 feet wide will be cleared at same level of effort 0.8 acre.
Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	3,350	\$36	L.F.	\$120,600	Means 32 31 13.20 0500; Assumes 3,100 L.F. in vicinity of Lewis Pond, and 250 L.F. at the tailrace
Gate for 6' high fence, 1-5/8" frame, 3' wide, galv. steel	12	\$358	Ea.	\$4,296	Means 32 31 13.20 1400
	S	Subtotal, C	Contractor	\$130,000	\$126,150
Si	ıbtotal, In	ıstall Secu	rity Fence	\$130,000	\$126,150
Post-Construction Submittals/As-Builts	1	\$6,500	Ea.	\$6,500	SHA estimate
Sul	ototal, Co	nstruction	Activities	\$149,500	
Scope Contingency (15% Construction Activities Subtotal)				\$22,000	OSWER 5-6: Assume 15% of Construction Activi Subtotal
Bid Contingency (15% Construction Activities Subtotal)				\$22,000	OSWER 5-6: Assume 15% of Construction Activi Subtotal
Subtotal, Construction	Activities	with Con	tingencies	\$190,000	
Professional/Technical Services Project Management (8% Construction Activities Subtotal w/Contingencies)				\$15,000	OSWER 5-8: Assume 8% of Construction Activiti Subtotal including contingencies
Remedial Design (15% Construction Activities Subtotal w/Contingencies)				\$29,000	OSWER 5-8: Assume 15% of Construction Activi Subtotal including contingencies
Construction Management (10% Construction Activities Subtotal w/Contingencies)				\$19,000	OSWER 5-8: Assume 10% of Construction Activi Subtotal including contingencies
Subtotal, Pr	rofessiona	l/Technica	al Services	\$63,000	
Institutional Controls Establish Deed Restrictions					
Engineer					
Endlish Long Could Country to the Country of Decidence	1.1	¢5,000	ъ.	¢55,000	CITA
Establish Institutional Controls in the form of Deed Restrictions	11	\$5,000	Ea.	\$55,000	SHA estimate; Costs estimated based on number o properties requiring deed restrictions.
	. 11	. ,	Ea.	\$55,000 \$55,000	
Restrictions		Subtotal			properties requiring deed restrictions.
Restrictions	al, Establis	Subtotal	, Engineer	\$55,000	\$55,000
Restrictions	al, Establis stablish In	Subtotal sh Deed R nstitutiona	, Engineer	\$55,000 \$55,000	properties requiring deed restrictions. \$55,000

### TABLE D-4a.2 Detailed Cost Estimate for Alternative SSW-2: Limited Action

### Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-2: Limited Action

DESCRIPTION
ANNUAL O&M COSTS
O&M Activities

UNIT

QTY COSTS UNITS

COST

COMMENTS/REFERENCE

Revision No.: 01 - DRAFT

Date: October 2007

Engineer					
Labor, Quarterly Inspections	4	\$990	Ea.	\$3,960	Unit cost assumes 10 labor hours at an average rate of \$99/hr. See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$594	L.S.	\$594	Assume 15% of field labor cost.
Labor, Annual Summary Report Preparation	22	\$124	Hr.	\$2,728	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	\$137	L.S.	\$137	Assume 5% of report preparation labor cost.
		Subtotal	, Engineer	\$7,400	\$7,419
\$	Subtotal, Qu	arterly I	nspections	\$7,400	\$7,419
8	, -	·	nspections Activitites	\$7,400 \$7,400	\$7,419
Scope Contingency (15% O&M Activities Subtotal)	, -	·	-	\$7,400	\$7,419 OSWER 5-6: Assume 15% of O&M Activities Subtot
	, -	·	-	<b>\$7,400</b> \$1,100	
Scope Contingency (15% O&M Activities Subtotal)	Subtot	al, O&M	Activitites	<b>\$7,400</b> \$1,100	OSWER 5-6: Assume 15% of O&M Activities Subto
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)  Subtotal, O&M	Subtot	al, O&M	Activitites	\$7,400 \$1,100 \$1,100	OSWER 5-6: Assume 15% of O&M Activities Subto
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)  Subtotal, O&M essional/Technical Services  Project Management (10% O&M Activities Subtotal	Subtot	al, O&M	Activitites	\$7,400 \$1,100 \$1,100 \$10,000	OSWER 5-6: Assume 15% of O&M Activities Subto OSWER 5-6: Assume 15% of O&M Activities Subto OSWER 5-8: Assume 10% of O&M Activities Subto
Scope Contingency (15% O&M Activities Subtotal)  Bid Contingency (15% O&M Activities Subtotal)  Subtotal, O&M essional/Technical Services	Subtot	al, O&M	Activitites	\$7,400 \$1,100 \$1,100 <b>\$10,000</b> \$1,000	OSWER 5-6: Assume 15% of O&M Activities Subto

### PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Existing Security Fencing (every 5 years)

Fence, chain link industrial, schedule 40, 2"	335	\$36	L.F.	\$12,060	Means 32 31 13.20 0500; Assumes 10% of security
posts @ 10' O.C., set in concrete, 6' H, 3 strands					fence is repaired every five years.
barb wire, 6 ga. wire, galv. steel					
	S	ubtotal, (	Contractor	\$12,000	\$12,060
Subtotal, Maintain Existing S	Security Fe	ence (ever	ry 5 years)	\$12,000	\$12,060
Subtotal, F	verv 5 Ye	ars O&M	Activities	\$12,000	
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)				\$1,800	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)					Activities Subtotal
Scope Contingency (15% of Every 5 Years O&M					OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal

### TABLE D-4a.2 Detailed Cost Estimate for

Revision No.: 01 - DRAFT

Date: October 2007

#### Detailed Cost Estimate for Alternative SSW-2: Limited Action

### Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-2: Limited Action

55W-2. Emitted Action		UNIT			
DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% of Every 5 Years O&M				\$1,600	OSWER 5-8: Assume 10% of O&M Activities Subtota
Activities Subtotal w/Contingencies)					including contingencies
Technical Support (15% of Every 5 Years O&M				\$2,400	OSWER 5-8: Assume 15% of O&M Activities Subtota
Activities Subtotal w/Contingencies)					including contingencies
Five-Year Review  Engineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of
					\$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
		Subtotal	, Engineer	\$13,000	\$13,020
	Subtota	ıl, Five-Ye	ar Review	\$13,000	\$13,020
Subtotal, F	Professiona	l/Technica	al Services	\$17,000	
	TOTAL,	PERIOD	IC COSTS	\$33,000	

Abbreviations:

 $Ea. = each \hspace{1cm} L.F. = linear \ feet \hspace{1cm} M.S.F. = thousand \ square \ feet$ 

#### Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition. RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

 $ECHOS, 2006, Environmental\ Remediation\ Cost\ Data\ -\ Assemblies,\ 12th\ Annual\ Edition.$   $ECHOS, 2006, Environmental\ Remediation\ Cost\ Data\ -\ Unit\ Price,\ 12th\ Annual\ Edition.$ 

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 6. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

## Appendix D-4b

**Cost Estimates for Alternative SSW-3** 

### **Cost Estimate Summary for**

Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%) Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

### **CAPITAL COSTS**

AL COSTS	
onstruction Activities	
Implementation Plans/Submittals	\$70,000
Residential Soil/Sediment Excavations	
Contractor	
Mobilization/Demobilization	\$4,900
Site Preparation	\$2,600
Excavation	\$34,000
Backfill	\$21,000
Site Restoration	\$22,000
Soil Stabilization	\$28,000
Transportation/Disposal	\$100,000
Subtotal, Contractor	\$220,000
Engineer	\$13,000
Laboratory	\$4,400
Subtotal, Residential Soil/Sediment Excavations	\$230,000
Former Mill Tailrace Excavation	
Contractor	
Mobilization/Demobilization	\$4,700
Site Preparation	\$20,000
Dredging & Dewatering	\$17,000
Wetlands Restoration	\$25,000
Soil Stabilization	\$1,600
Transportation/Disposal	\$16,000
Subtotal, Contractor	\$85,000
Engineer	\$13,000
Laboratory	\$1,200
Subtotal, Former Mill Tailrace Excavation	\$100,000
Upgrade/Repair West Street Dam	
Contractor	
Mobilization/Demobilization	\$2,200
Upgrade/Repair Dam	\$120,000
Subtotal, Contractor	\$130,000
Engineer	\$15,000
Subtotal, Upgrade/Repair West Street Dam	\$140,000
	4

Post-Construction Submittals/As-Builts

\$24,000

### **Cost Estimate Summary for**

Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%) Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

Subtotal, Construction Activities	\$560,000
Scope Contingency (15% Construction Activities Subtotal)	\$84,000
Bid Contingency (15% Construction Activities Subtotal)	\$84,000
Subtotal, Construction Activities with Contingencies	\$730,000
Professional/Technical Services	
Project Management (6% Construction Activities Subtotal w/Contingencies)	\$44,000
Remedial Design (12% Construction Activities Subtotal w/Contingencies)	\$88,000
Construction Management (8% Construction Activities Subtotal w/Contingencies)	\$58,000
Subtotal, Professional/Technical Services	\$190,000
Institutional Controls	
Establish Deed Restrictions	\$35,000
Subtotal, Institutional Controls	\$35,000
TOTAL, CAPITAL COSTS	\$1,000,000
TOTAL, CALITAL COSTS	\$1,000,000
ANNUAL O&M COSTS	
O&M Activities	
Annual West Street Dam Inspection	\$10,000
Timidal West Bareet Baili Inspection	Ψ10,000
Subtotal, O&M Activities	\$10,000
Scope Contingency (15% Annual O&M Activities Subtotal)	\$1,500
Bid Contingency (15% Annual O&M Activities Subtotal)	\$1,500
Subtotal, O&M Activities with Contingencies	\$13,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$1,300
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,950
Subtotal, Professional/Technical Services	\$3,300
TOTAL, ANNUAL O&M COSTS	\$16,000
PERIODIC COSTS	
O&M Activities	
Year 1 Only O&M Activities	
Post-Reconstruction Wetlands Monitoring (year 1 only)	\$7,200
rost-reconstruction wettainds Mointoning (year 1 only)	\$7,200
Subtotal, Year 1 Only O&M Activities	\$7,200
Scope Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,100
Bid Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,100
Subtotal, Year 1 Only O&M Activities with Contingencies	\$9,000
Subtotal, O&M Activities	\$9,000

### **Cost Estimate Summary for**

Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%) Feasibility Study

## Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

### **Professional/Technical Services**

Project Management (10% O&M Activities Subtotal w/Contingencies) \$900
Technical Support (15% O&M Activities Subtotal w/Contingencies) \$1,350
Five-Year Review \$13,000
Subtotal, Professional/Technical Services \$15,000

### **TOTAL, PERIODIC COSTS**

\$24,000

### PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	Total Cost	Total Cost Per Year	Discount Factor	Present Value
Capital Costs	0	\$1,000,000	\$1,000,000	1	\$1,000,000
Annual O&M Costs	1-100	\$1,600,000	\$16,000	14.3	\$230,000
Periodic Costs	1	\$11,000	\$11,000	0.935	\$10,000
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,300
Periodic Costs	10	\$13,000	\$13,000	0.508	\$6,600
Periodic Costs	15	\$13,000	\$13,000	0.362	\$4,700
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$870
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$620
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$440
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$81
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$58
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$41
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

### TOTAL PRESENT VALUE OF ALTERNATIVE

\$1,300,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE D-4b.2Revision No.: 01 - DRAFTDetailed Cost Estimate forDate: October 2007

Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

Feasibility Study

Blackburn & Union Privileges Superfund Site

Walpole, Massachusetts

NIPTION	OTE	UNIT	LIMITEC	COCT	COMMENTS/DECEDENCE
RIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
AL COSTS					
onstruction Activities Implementation Plans/Submittals	1	\$70,000	Eo	\$70,000	SHA estimate
implementation Frans/Submittais	1	\$70,000	Ea.	\$70,000	SHA estimate
Residential Soil/Sediment Excavations					
Contractor  Mobilization/Demobilization					
Mob/Demob, Loader, Compactor 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per
M I (David F and Alam 150 HD	2	¢c12	г.	¢1.226	mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per
December 1 inht Fouriers and	1	¢100	E-	\$100	mob/demob.
Decontaminate Light Equipment  Decontaminate Medium Equipment	4	\$199 \$399			ECHOS 33 17 0801; Assumes H&S level D. ECHOS 33 17 0802; Includes water truck; Assur
Decontaininate Medium Equipment	+	φυσσ	Ea.	\$1,390	H&S level D.
Subtot	al, Mobiliza	tion/Dem	obilization =	\$4,900	\$4,897
Site Preparation					
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	600	\$4.28	L.F.	\$2,568	ECHOS 18 05 0206
	Subto	tal, Site P	reparation	\$2,600	\$2,568
		,	•		
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic	40	\$299	Hr.	\$11,960	ECHOS 17 03 0231; Assumes H&S level C.
Excavator					
926, 2.0 CY, Wheel Loader	40	\$204			ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	40	\$180			ECHOS Crew Code COBBC; Assumes H&S lev
Water Truck	40	\$103	Hr.	\$4,896	ECHOS Crew Code COKBM (Modified); Assur H&S level C.
Sprayed Water Dust Suppressant	21,400	\$0.06	S.F.	\$1,284	ECHOS 33 08 0585; Assumes H&S level C.
	5	Subtotal, l	Excavation =	\$34,000	\$33,500
D. J.C.					
Backfill Crawler-mounted, 1.25 C.Y. 225 Hydraulic	24	¢100	T.T	¢4.776	ECHOS 17 02 0221
Excavator	24	\$199	Hr.	\$4,776	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	24	\$130	Hr.		ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24	\$344	Hr.	\$8,256	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	424	\$12	C.Y.	\$5,088	ECHOS 02223 1001
		Subtot	al, Backfill	\$21,000	\$21,240
Site Restoration			1		
Topsoil, Furnish & Place, 6" Lifts, Off-site	397		C.Y.		ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	22	\$27	M.S.F.	\$594	Means 32 92 19.13 0800
	Subto	tal, Site R	Restoration =	\$22,000	\$22,429
Soil Stabilization					
In-Situ Cement Stabilization, 6%	820	\$34	B.C.Y.	\$27,880	ECHOS 17 03 0602; Assumes 100% of excavate
,				. ,	soil/sediment will require stabilization; Assumes
	C.L.L.	al Call C	abilizati :	636 000	level C.
	Subtot	iai, Soil St	abilization	\$28,000	\$27,880
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	1,304	\$80	Ton	\$104,320	SHA discussions with Waste Management, Inc.;
					Includes excavated material plus stabilizing addi
					6%.
Subt	otal, Transp	ortation o	& Disposal	\$100,000	\$104,320
5450	<sub>-</sub>		z z zposta.		

Revision No.: 01 - DRAFT Date: October 2007 **Detailed Cost Estimate for** Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace

(Asbestos  $\geq$  1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos  $\geq 1\%$ )

TION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	110	\$99			Assumes 2 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,634	L.S.	\$1,634	Assumes 15% of labor cost
		Subtotal	, Engineer	\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	4	\$965	Ea.	\$3,860	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Lead Confirmatory	5	\$13	Ea.	\$65	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	10	\$50	Ea.	\$500	SHA discussions with EMSL Analytical, Inc.
	S	ubtotal, L	aboratory	\$4,400	\$4,425
Subtotal, Resident	ial Soil/Se	ediment Ex	cavations	\$230,000	\$233,783
E MILET E C					
Former Mill Tailrace Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Clamshell, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	\$305	Ea.	\$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	\$200			ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399			ECHOS 33 17 0802; Includes frac tank; Assumes I level D.
			-		
Subtotal	, Mobiliza	tion/Demo	obilization	\$4,700	\$4,674
	, Mobiliza	tion/Demo	obilization	\$4,700	\$4,674
Site Preparation				. ,	. ,
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with	, Mobiliza	\$4.28		. ,	\$4,674 ECHOS 18 05 0206
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	150	\$4.28	L.F.	\$642	ECHOS 18 05 0206
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with	150	\$4.28 \$190	L.F.	\$642	. ,
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment	150	\$4.28 \$190	L.F.	\$642 \$19,000	ECHOS 18 05 0206 SHA discussions with Gunderboom, Inc.
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering	150 100 Subtot	\$4.28 \$190 tal, Site Pr	L.F	\$642 \$19,000 \$20,000	ECHOS 18 05 0206  SHA discussions with Gunderboom, Inc. \$19,642
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom	150 100 Subtot	\$4.28 \$190 <b>tal, Site P</b> 1	L.F.  eparation  Hr.	\$642 \$19,000 \$20,000	ECHOS 18 05 0206  SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C.
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader	150 100 <b>Subtot</b>	\$4.28 \$190 <b>tal, Site Pr</b> \$642 \$204	L.Feparation Hr. Hr.	\$642 \$19,000 \$20,000 \$10,272 \$3,264	ECHOS 18 05 0206  SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C.
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader Bobcat	150 100 <b>Subtot</b> 16 16	\$4.28 \$190 <b>tal, Site Pr</b> \$642 \$204 \$180	L.Feparation  HrHrHr.	\$642 \$19,000 \$20,000 \$10,272 \$3,264 \$2,880	ECHOS 18 05 0206  SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C. ECHOS Crew Code COBBC; Assumes H&S level
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader Bobcat 10,000 gal Fractionation Tank (coated interior)	150 100 <b>Subtot</b> 16 16 16	\$4.28 \$190 <b>tal, Site Pr</b> \$642 \$204 \$180 \$87	L.F.  ceparation  Hr. Hr. Hr. Week	\$19,000 \$20,000 \$10,272 \$3,264 \$2,880 \$174	ECHOS 18 05 0206  SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C. ECHOS Crew Code COBBC; Assumes H&S level Rain for Rent, Inc. Quote dated 09/20/07
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader Bobcat	150 100 <b>Subtot</b> 16 16	\$4.28 \$190 <b>tal, Site Pr</b> \$642 \$204 \$180 \$87	L.Feparation  HrHrHr.	\$19,000 \$20,000 \$10,272 \$3,264 \$2,880 \$174	ECHOS 18 05 0206  SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C. ECHOS Crew Code COBBC; Assumes H&S level

Revision No.: 01 - DRAFT Date: October 2007 **Detailed Cost Estimate for** Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace

(Asbestos  $\geq$  1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) Feasibility Study Blackburn & Union Privileges Superfund Site

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos > 1%)

Walpole, Massachusetts

PTION			UNIT			
	I	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
	Wetlands Restoration	VII	CO313	UNIIS	COSI	COMMENTS/REPERENCE
	(Includes restoration of additional 400 S.F. due t	o construct	ion distur	·hance)		
	1.5 CY Clamshell, with 60' Boom	16	\$435		\$6,960	ECHOS 17 03 0252
	926, 2.0 CY, Wheel Loader	16	\$130			ECHOS 17 03 0232 ECHOS 17 03 0222
	Bobcat	16	\$112			ECHOS Crew Code COBBC
	Topsoil, Furnish & Place, 6" Lifts, Off-site	33		C.Y.	. , ,	ECHOS 18 05 0301
	Screened Leaf Compost, Delivered	25		C.Y.		SHA discussions with Agresource, Inc.
	Trees, 2-3' CG - 15' on center, 5/M.S.F.	2	\$50			SHA discussions with Normandeau Associates,
	Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	6	\$20			SHA discussions with Normandeau Associates,
	Fertilizer Tablets, 1/plant, 250 count per box	1	\$30			SHA discussions with Normandeau Associates,
	Wetland Seed Mix	2		Pounds		SHA discussions with Normandeau Associates,
	Conservation Seed Mix	1		Pounds		SHA discussions with Normandeau Associates,
	Annual Rye Grass	1		Pounds		SHA discussions with Normandeau Associates,
	Aquatic Plants, 2' on center, wetland, 250/M.S.F.	275	\$5.00			SHA discussions with Normandeau Associates,
	Planting/Seeding Labor	8	\$66			SHA discussions with Normandeau Associates, ECHOS Crew Code ULABA
	Wetlands Specialist, Construction Oversight	40	\$100	Hr.	\$4,000	SHA discussions with Normandeau Associates,
						Assumes upto 5 site visits during and immediate following construction/restoration activities.
	G	2	¢2.050	D.	¢5 000	ECHOS 00 04 1201 A
	Surveying, 2-person Crew	2	\$2,950			ECHOS 99 04 1201; Assumes H&S level C.
		Subtotal, W	etlands R	estoration	\$25,000	\$25,325
	0.20(12)					
	Soil Stabilization	50	¢22	D.C.V	¢1.coo	ECHOC 17 02 0002 A
	Cement Stabilization, 6%	50	\$32	B.C.Y.	\$1,600	ECHOS 17 03 0602; Assumes 100% of excavate
						soil/sediment will require stabilization; Assumes
						level C.
		Subtot	al, Soil St	abilization	\$1,600	\$1,600
	Transportation/Disposal					
	Asbestos-Impacted Soils, Non-Hazardous	93	\$125	Ton	\$11,625	SHA discussions with Waste Management, Inc.;
						Includes additional roll-off delivery/pickup costs
	Water, Asbestos-Impacted, Non-Hazardous	5,000	\$0.95	Gal.	\$4,750	SHA discussions with N.E. Environmental Solut
						Inc.; Assumes no pre-treatment of water.
	Subto	tal, Transp	ortation o	& Disposal	\$16,000	\$16,375
	Subto			& Disposal Contractor	\$16,000 \$85,000	\$16,375 \$84,624
	Subto			-		
Engi				-		
Engi	ineer	S	Subtotal, (	Contractor	\$85,000	\$84,624
Engi	ineer Labor		Subtotal, (	Contractor	\$85,000 \$10,890	\$84,624 Assumes 10 days of field work; See Note 3.
Engi	ineer  Labor  Misc. Field Expenses (e.g. mileage, personal	110	Subtotal, (	Contractor	\$85,000 \$10,890	\$84,624
Engi	ineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	110	Subtotal, (	Contractor	\$85,000 \$10,890	\$84,624 Assumes 10 days of field work; See Note 3.
Engi	ineer  Labor  Misc. Field Expenses (e.g. mileage, personal	110	\$99 \$1,634	hr l.s.	\$85,000 \$10,890 \$1,634	\$84,624 Assumes 10 days of field work; See Note 3. Assumes 15% of labor cost
Engi	ineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	110	\$99 \$1,634	Contractor	\$85,000 \$10,890	\$84,624 Assumes 10 days of field work; See Note 3.
	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	110	\$99 \$1,634	hr l.s.	\$85,000 \$10,890 \$1,634	\$84,624 Assumes 10 days of field work; See Note 3. Assumes 15% of labor cost
	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	110	\$99 \$1,634 Subtotal	hr l.s.	\$85,000 \$10,890 \$1,634 \$13,000	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524
	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	110	\$99 \$1,634	hr l.s.	\$85,000 \$10,890 \$1,634	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524
	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  bratory Chemical analysis, Soil Management Assessment	110	\$99 \$1,634 Subtotal	hr l.s. , Engineer	\$85,000 \$10,890 \$1,634 \$13,000 \$965	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524
	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  bratory Chemical analysis, Soil Management Assessment Package I	110 1 1 5	\$99 \$1,634 <b>Subtotal</b> \$965	hr l.s. , Engineer	\$85,000 \$10,890 \$1,634 \$13,000 \$965	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La
	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  bratory Chemical analysis, Soil Management Assessment Package I	110 1 1 5	\$99 \$1,634 <b>Subtotal</b> \$965	hr l.s. , Engineer Ea. Ea.	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La SHA discussions with EMSL Analytical, Inc.
	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  bratory Chemical analysis, Soil Management Assessment Package I	110 1 1 5 8	\$99 \$1,634 Subtotal \$965 \$50 ubtotal, I	hr l.s. , Engineer Ea. Ea. aboratory	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La SHA discussions with EMSL Analytical, Inc.
	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  bratory Chemical analysis, Soil Management Assessment Package I Chemical analysis, Asbestos Confirmatory	110 1 1 5 8	\$99 \$1,634 Subtotal \$965 \$50 ubtotal, I	hr l.s. , Engineer Ea. Ea. aboratory	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250 \$1,200	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La  SHA discussions with EMSL Analytical, Inc.  \$1,215
Labo	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  bratory Chemical analysis, Soil Management Assessment Package I Chemical analysis, Asbestos Confirmatory	110 1 1 5 8	\$99 \$1,634 Subtotal \$965 \$50 ubtotal, I	hr l.s. , Engineer Ea. Ea. aboratory	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250 \$1,200	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La  SHA discussions with EMSL Analytical, Inc.  \$1,215
Labo	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Pratory Chemical analysis, Soil Management Assessment Package I Chemical analysis, Asbestos Confirmatory  Subtotal, Fo	110 1 1 5 8	\$99 \$1,634 Subtotal \$965 \$50 ubtotal, I	hr l.s. , Engineer Ea. Ea. aboratory	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250 \$1,200	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La  SHA discussions with EMSL Analytical, Inc.  \$1,215
Labo	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Pratory Chemical analysis, Soil Management Assessment Package I Chemical analysis, Asbestos Confirmatory  Subtotal, Forade/Repair West Street Dam	110 1 1 5 8	\$99 \$1,634 Subtotal \$965 \$50 ubtotal, I	hr l.s. , Engineer Ea. Ea. aboratory	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250 \$1,200	\$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La  SHA discussions with EMSL Analytical, Inc.  \$1,215
Labo	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Pratory Chemical analysis, Soil Management Assessment Package I Chemical analysis, Asbestos Confirmatory  Subtotal, Foractor Mobilization/Demobilization	110 1 1 5 S	\$99 \$1,634 Subtotal \$965 \$50 ubtotal, I	hr l.s. , Engineer  Ea. Ea. aboratory	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250 \$1,200 \$100,000	Assumes 10 days of field work; See Note 3. Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La SHA discussions with EMSL Analytical, Inc. \$1,215 \$98,363
Labo	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Pratory Chemical analysis, Soil Management Assessment Package I Chemical analysis, Asbestos Confirmatory  Subtotal, Forade/Repair West Street Dam	110 1 1 5 8	\$99 \$1,634 Subtotal \$965 \$50 ubtotal, I	hr l.s. , Engineer  Ea. Ea. aboratory	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250 \$1,200	Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La  SHA discussions with EMSL Analytical, Inc.  \$1,215  \$98,363  Means 01 54 36.50 0100; Assumes 50 miles per
Labo	Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Pratory Chemical analysis, Soil Management Assessment Package I Chemical analysis, Asbestos Confirmatory  Subtotal, Foractor Mobilization/Demobilization	110 1 1 5 S	\$99 \$1,634 Subtotal \$965 \$50 ubtotal, I	hr l.s. , Engineer  Ea.  Ea. aboratory  Excavation	\$85,000 \$10,890 \$1,634 \$13,000 \$965 \$250 \$1,200 \$100,000	Assumes 10 days of field work; See Note 3. Assumes 15% of labor cost  \$12,524  2006-2007 Fee Schedule, Alpha Woods Hole La SHA discussions with EMSL Analytical, Inc. \$1,215 \$98,363

Revision No.: 01 - DRAFT TABLE D-4b.2 Date: October 2007 **Detailed Cost Estimate for** 

Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) Feasibility Study

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos  $\geq 1\%$ )

CRIPTIC	ON	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
	Upgrade/Repair Dam	V.1	20010	011111	0001	O.I.I.IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
	Cleaning Masonry, High pressure water and chemical	280	\$4.00	S.F	\$1,120	Means 04 01 30.20 0440
	Grout, non-shrink, non-metallic, 1" deep	210	\$23	S.F.	\$4,830	Means 03 62 13.50 0300
	Install gate and automatic level controls	80	\$499	Hr.	\$39,920	ECHOS Crew Code UOEHC
	Gate & Automatic Level Control	1	\$40,000	L.S.	\$40,000	SHA discussions with Goldsmith, Prest, & Rangwa Inc.
	Fabricated Pedestrian Bridge/Deck, steel, trusted or arch spans, compl. in place, 8'-wide, 40' span	320	\$119	S.F	\$38,080	Means 32 34 20.10 0300
	S	ubtotal, U	pgrade/Re	epair Dam	\$120,000	\$123,950
				Contractor	\$130,000	\$126,136
En	ngineer					
	Labor	132	\$99	hr	\$13,068	Assumes 3 weeks of field work; See Note 3.
	Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,961	1.s.	\$1,961	Assumes 15% of labor cost
	,		Subtotal	, Engineer	\$15,000	\$15,029
	Subtotal, Upg	rade/Repa	ir West S	treet Dam	\$140,000	\$141,165
Po	ost-Construction Submittals/As-Builts	1	\$24,000	Ea.	\$24,000	SHA estimate
	Su	btotal, Coi	ıstruction	Activities	\$560,000	
		, i				
Su	cope Contingency (15% Construction Activities ubtotal)				\$84,000	OSWER 5-6: Assume 15% of Construction Activit Subtotal
	id Contingency (15% Construction Activities ubtotal)				\$84,000	OSWER 5-6: Assume 15% of Construction Activit Subtotal
	Subtotal, Construction	Activities	with Con	tingencies	\$730,000	
Professi	ional/Technical Services					
Pr	ional/Technical Services roject Management (6% Construction Activities ubtotal w/Contingencies)				\$44,000	Subtotal including contingencies
Pro Su Re w/o	roject Management (6% Construction Activities abtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal /Contingencies)					Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies
Pro Su Re w/o Co	oject Management (6% Construction Activities ubtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal					Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies
Pro- Su Re w/o Co	roject Management (6% Construction Activities abtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal /Contingencies) onstruction Management (8% Construction Activities	rofessional	I/Technica	al Services	\$88,000	Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activitie
Prostuti	roject Management (6% Construction Activities ubtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal /Contingencies) onstruction Management (8% Construction Activities ubtotal w/Contingencies) Subtotal, P	rofessional	l/Technica	al Services	\$88,000 \$58,000	Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activitie
Prostuti	roject Management (6% Construction Activities abtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal /Contingencies) onstruction Management (8% Construction Activities abtotal w/Contingencies) Subtotal, P	rofessional	I/Technica	al Services	\$88,000 \$58,000	Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activitie
Pr. Su Re w// Co Su Instituti Es	roject Management (6% Construction Activities ubtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal //Contingencies) onstruction Management (8% Construction Activities ubtotal w/Contingencies) Subtotal, P ional Controls stablish Deed Restrictions				\$88,000 \$58,000 \$190,000	Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activitie Subtotal including contingencies
Pr. Su Re w/ Co Su Instituti Es	roject Management (6% Construction Activities ubtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal /Contingencies) onstruction Management (8% Construction Activities ubtotal w/Contingencies) Subtotal, P ional Controls stablish Deed Restrictions	rofessional	\$5,000	Ea.	\$88,000 \$58,000 <b>\$190,000</b> \$35,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies  Costs estimated based on number of properties requiring deed restrictions.
Pr. Su Re w// Co Su Instituti Es	roject Management (6% Construction Activities ubtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal //Contingencies) onstruction Management (8% Construction Activities ubtotal w/Contingencies)  Subtotal, P  ional Controls stablish Deed Restrictions  ngineer  Establish Institutional Controls in the form of Deed		\$5,000		\$88,000 \$58,000 \$190,000	Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activitie Subtotal including contingencies  Costs estimated based on number of properties
Pr. Su Re w// Co Su Instituti Es	roject Management (6% Construction Activities ubtotal w/Contingencies) emedial Design (12% Construction Activities Subtotal //Contingencies) onstruction Management (8% Construction Activities ubtotal w/Contingencies)  Subtotal, P  ional Controls stablish Deed Restrictions  ngineer  Establish Institutional Controls in the form of Deed Restrictions	7	\$5,000 Subtotal	Ea.	\$88,000 \$58,000 <b>\$190,000</b> \$35,000	Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activitie Subtotal including contingencies  Costs estimated based on number of properties requiring deed restrictions.
Rew//CoSu Instituti	roject Management (6% Construction Activities ubtotal w/Contingencies)  emedial Design (12% Construction Activities Subtotal //Contingencies)  construction Management (8% Construction Activities ubtotal w/Contingencies)  Subtotal w/Contingencies)  Subtotal, P  ional Controls stablish Deed Restrictions  mgineer  Establish Institutional Controls in the form of Deed Restrictions  Subtotal	7 al, Establis	\$5,000 Subtotal	Ea. , Engineer	\$88,000 \$58,000 <b>\$190,000</b> \$35,000	Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activit Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activitie Subtotal including contingencies  Costs estimated based on number of properties requiring deed restrictions.  \$35,000

Revision No.: 01 - DRAFT TABLE D-4b.2 Date: October 2007 **Detailed Cost Estimate for** 

COMMENTS/REFERENCE

COST

Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%) Feasibility Study

> Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos  $\geq 1\%$ )

UNIT COSTS UNITS

DESCRIPTION ANNUAL O&M COSTS **O&M** Activities

**Annual West Street Dam Inspection** 

Engineer

Zinginter.					
West Street Dam Inspection & Minor Repairs	1	\$10,000	L.S.	\$10,000	SHA estimate.
	•	Subtotal	, Engineer	\$10,000	\$10,000
Subtotal, Annu	ıal West St	reet Dam	Inspection	\$10,000	\$10,000
	Subto	otal, O&M	Activities	\$10,000	
	1	ı	I		I
Scope Contingency (15% Annual O&M Activities				\$1,500	OSWER 5-6: Assume 15% of Annual O&M Activities
Subtotal)					Subtotal
Bid Contingency (15% Annual O&M Activities				\$1,500	OSWER 5-6: Assume 15% of Annual O&M Activities

Subtotal) Subtotal Subtotal, O&M Activities with Contingencies \$13,000

Professional/Technical Services

\$1,300 OSWER 5-8: Assume 10% of O&M Activities Subtotal Project Management (10% O&M Activities Subtotal including contingencies w/Contingencies) Technical Support (15% O&M Activities Subtotal \$1,950 OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies w/Contingencies)

Subtotal, Professional/Technical Services \$3,300

> TOTAL, ANNUAL O&M COSTS \$16,000

### PERIODIC COSTS

**O&M** Activities

Year 1 Only O&M Activities

1	\$7,200	L.S.	\$7,200	SHA discussions with Normandeau Associates, Inc.; Assumes upto 3 post-reconstruction site visits to occ during the following two growing seasons and summary report preparation.
S	Subtotal, C	ontractor ===	\$7,200	\$7,200
s Moni	toring (ye	ar 1 only)	\$7,200	\$7,200
ear 1 O	nly O&M	Activities	\$7,200	
			\$1,100	OSWER 5-6: Assume 15% of Year 1 Only O&M Activities Subtotal
			\$1,100	OSWER 5-6: Assume 15% of Year 1 Only O&M Activities Subtotal
	s Moni	Subtotal, C	Subtotal, Contractor s Monitoring (year 1 only) ear 1 Only O&M Activities	Subtotal, Contractor \$7,200 s Monitoring (year 1 only) \$7,200 ear 1 Only O&M Activities \$7,200 \$1,100

Subtotal, O&M Activities \$9,000

TABLE D-4b.2 Revision No.: 01 - DRAFT Date: October 2007 **Detailed Cost Estimate for** 

\$24,000

Alternative SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%) Feasibility Study

> Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-3: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Aqueous Cap on Lewis Pond Sediment (Asbestos  $\geq 1\%$ )

		UNIT			
DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% O&M Activities Subtotal w/Contingencies)				\$900	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
Technical Support (15% O&M Activities Subtotal w/Contingencies)				\$1,350	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Five-Year Review					
Engineer					
Labor	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of \$124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	\$620	L.S.	\$620	Assume 5% of labor costs.
		Subtotal	, Engineer	\$13,000	\$13,020
	Subtota	ıl, Five-Ye	ear Review	\$13,000	\$13,020
Subtota	l, Professiona	l/Technic	al Services	\$15,000	

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sump S.F. = square feet C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = monthS.Y. = square yard

Ea. = eachL.F. = linear feetM.S.F. = thousand square feet

#### Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.

RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition, ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.

TOTAL, PERIODIC COSTS

- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the former mill tailrace quantity estimates:
  - a.) We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y. volume.
  - b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
  - c.) We assumed 1 cubic yard of dredged and dewatered sediments weighs approximately 1.75 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

## Appendix D-4c

**Cost Estimates for Alternative SSW-4** 

### **Cost Estimate Summary for**

Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos ≥ 1%) Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

### CAPITAL COSTS

\$74,000 \$4,900 \$2,600 \$34,000 \$21,000 \$22,000 \$28,000 \$100,000 \$220,000 \$13,000 \$4,400 \$230,000
\$4,900 \$2,600 \$34,000 \$21,000 \$22,000 \$28,000 \$100,000 \$220,000 \$13,000 \$4,400
\$2,600 \$34,000 \$21,000 \$22,000 \$28,000 \$100,000 \$220,000 \$13,000 \$4,400
\$2,600 \$34,000 \$21,000 \$22,000 \$28,000 \$100,000 \$220,000 \$13,000 \$4,400
\$2,600 \$34,000 \$21,000 \$22,000 \$28,000 \$100,000 \$220,000 \$13,000 \$4,400
\$34,000 \$21,000 \$22,000 \$28,000 \$100,000 \$220,000 \$13,000 \$4,400
\$21,000 \$22,000 \$28,000 \$100,000 \$220,000 \$13,000 \$4,400
\$22,000 \$28,000 \$100,000 \$220,000 \$13,000 \$4,400
\$28,000 \$100,000 \$220,000 \$13,000 \$4,400
\$100,000 \$220,000 \$13,000 \$4,400
\$220,000 \$13,000 \$4,400
\$13,000 \$4,400
\$4,400
\$230,000
Ψ230,000
\$4,700
\$20,000
\$17,000
\$25,000
\$1,600
\$16,000
\$85,000
\$13,000
\$1,200
\$100,000
\$4,100
\$8,100
\$260,000
\$120,000
\$390,000
\$25,000
\$410,000
_

### **Cost Estimate Summary for**

Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos ≥ 1%) Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

Subtotal, Construction Activities	\$850,000
Scope Contingency (15% Construction Activities Subtotal)	\$130,000
Bid Contingency (15% Construction Activities Subtotal)	\$130,000
Subtotal, Construction Activities with Contingencies	\$1,100,000
Professional/Technical Services	
Project Management (6% Construction Activities Subtotal w/Contingencies)	\$70,000
Remedial Design (12% Construction Activities Subtotal w/Contingencies)	\$132,000
Construction Management (8% Construction Activities Subtotal w/Contingencies)	\$88,000
Subtotal, Professional/Technical Services	\$290,000
Institutional Controls	
Establish Deed Restrictions	\$35,000
Subtotal, Institutional Controls	\$35,000
TOTAL, CAPITAL COSTS	\$1,400,000
ANNUAL O&M COSTS	
O&M Activities	
Isolation Cap Maintenance Contractor	
Mobilization/Demobilization	\$880
Cap Maintanence/Repairs	\$2,500
Subtotal. Contractor	\$3,400
Subtotal, Contractor	\$3,400
Engineer	\$1,100
Subtotal, Isolation Cap Maintenance	\$4,600
Subtotal, O&M Activities	\$4,600
Scope Contingency (15% Annual O&M Activities Subtotal)	\$690
Bid Contingency (15% Annual O&M Activities Subtotal)	\$690
Subtotal, O&M Activities with Contingencies	\$6,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$600
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$900
Subtotal, Professional/Technical Services	\$1,500
TOTAL, ANNUAL O&M COSTS	\$7,500

### **Cost Estimate Summary for**

Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) **Feasibility Study** 

### Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

### PERIODIC COSTS

### **O&M** Activities

Year 1 Only O&M Activities	
Post-Reconstruction Wetlands Monitoring (year 1 only)	\$9,600
Subtotal, Year 1 Only O&M Activities	\$9,600
Scope Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,400
Bid Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,400
Subtotal, Year 1 Only O&M Activities with Contingencies	\$12,000
Subtotal, O&M Activities	\$12,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$1,200
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,800
Five-Year Review	\$13,000
Subtotal, Professional/Technical Services	\$16,000

### TOTAL, PERIODIC COSTS

### \$28,000

### PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	Total Cost	Total Cost Per Year	Discount Factor	<u>Present Value</u>
Capital Costs	0	\$1,400,000	\$1,400,000	1	\$1,400,000
Annual O&M Costs	1-100	\$750,000	\$7,500	14.3	\$110,000
Periodic Costs	1	\$15,000	\$15,000	0.935	\$14,000
Periodic Costs	5	\$13,000	\$13,000	0.713	\$9,300
Periodic Costs	10	\$13,000	\$13,000	0.508	\$6,600
Periodic Costs	15	\$13,000	\$13,000	0.362	\$4,700
Periodic Costs	20	\$13,000	\$13,000	0.258	\$3,400
Periodic Costs	25	\$13,000	\$13,000	0.184	\$2,400
Periodic Costs	30	\$13,000	\$13,000	0.131	\$1,700
Periodic Costs	35	\$13,000	\$13,000	0.0937	\$1,200
Periodic Costs	40	\$13,000	\$13,000	0.0668	\$870
Periodic Costs	45	\$13,000	\$13,000	0.0476	\$620
Periodic Costs	50	\$13,000	\$13,000	0.0339	\$440
Periodic Costs	55	\$13,000	\$13,000	0.0242	\$310
Periodic Costs	60	\$13,000	\$13,000	0.0173	\$220
Periodic Costs	65	\$13,000	\$13,000	0.0123	\$160
Periodic Costs	70	\$13,000	\$13,000	0.00877	\$110
Periodic Costs	75	\$13,000	\$13,000	0.00625	\$81
Periodic Costs	80	\$13,000	\$13,000	0.00446	\$58
Periodic Costs	85	\$13,000	\$13,000	0.00318	\$41
Periodic Costs	90	\$13,000	\$13,000	0.00227	\$30
Periodic Costs	95	\$13,000	\$13,000	0.00162	\$21
Periodic Costs	100	\$13,000	\$13,000	0.00115	\$15

### TOTAL PRESENT VALUE OF ALTERNATIVE

\$1,600,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

Revision No.: 01 - DRAFT **Detailed Cost Estimate for** Date: October 2007 Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace

(Asbestos  $\geq$  1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sec

		UNIT			
TION	OTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
COSTS	Q11	00010	011110	0051	COMMENTS/REFERENCE
cruction Activities					
Implementation Plans/Submittals	1	\$74,000	Ea.	\$74,000	SHA estimate
Residential Soil/Sediment Excavations					
Contractor					
Mobilization/Demobilization	4	¢417	г	¢1.660	M 01.54.26.50.0020 A 50. 'I
Mob/Demob, Loader, Compactor 70 to 150 HP	4	\$417		. ,	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$199	Ea.	\$199	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes water truck; Assum
					H&S level D.
Subtotal,	Mobiliza	ation/Dem	obilization	\$4,900	
Site Preparation					
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	600	\$4.28	L.F.	\$2,568	ECHOS 18 05 0206
posts	Subto	tal, Site P	reparation =	\$2,600	\$2,568
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	40	\$299	Hr.	\$11,960	ECHOS 17 03 0231; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	40	\$204	Hr.	\$8,160	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	40	\$180	Hr.	\$7,200	ECHOS Crew Code COBBC; Assumes H&S leve
Water Truck	40	\$103	Hr.	\$4,896	ECHOS Crew Code COKBM (Modified); Assum H&S level C.
Sprayed Water Dust Suppressant	21,400	\$0.06	S.F.	\$1,284	ECHOS 33 08 0585; Assumes H&S level C.
		Subtotal, 1	Excavation	\$34,000	\$33,500
Backfill					T
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	\$199			ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	24	\$130	Hr.	\$3,120	ECHOS 17 03 0222
320, 210 C1, Wheel Bouder					
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24	\$344	Hr.	\$8,256	ECHOS Crew Code COFCQ (Modified)
	424		Hr.		ECHOS Crew Code COFCQ (Modified) ECHOS 02223 1001
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide		\$12			
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide Unclassified Fill, Delivered, Off-site Site Restoration		\$12 Subtot	C.Yal, Backfill	\$5,088	ECHOS 02223 1001
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide Unclassified Fill, Delivered, Off-site		\$12 Subtot	C.Y.	\$5,088 \$21,000	ECHOS 02223 1001
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide Unclassified Fill, Delivered, Off-site Site Restoration	424	\$12 Subtot	C.Yal, Backfill	\$5,088 \$21,000 \$21,835 \$594	ECHOS 02223 1001 \$21,240
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration  Topsoil, Furnish & Place, 6" Lifts, Off-site  Mechanical Seeding, Grass seed hand push	397 22	\$12 <b>Subtot</b> \$55 \$27	C.Y.	\$5,088 \$21,000 \$21,835	ECHOS 02223 1001 \$21,240 ECHOS 18 05 0301
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration  Topsoil, Furnish & Place, 6" Lifts, Off-site  Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	397 22	\$12 <b>Subtot</b> \$55 \$27	C.Y. al, Backfill C.Y. M.S.F.	\$5,088 \$21,000 \$21,835 \$594	ECHOS 02223 1001 \$21,240 ECHOS 18 05 0301 Means 32 92 19.13 0800
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration  Topsoil, Furnish & Place, 6" Lifts, Off-site  Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.  Soil Stabilization	397 22 Subto	\$12 Subtot \$55 \$27 Otal, Site F	C.Yal, Backfill  C.Y M.S.F	\$5,088 \$21,000 \$21,835 \$594 \$22,000	ECHOS 02223 1001 \$21,240 ECHOS 18 05 0301 Means 32 92 19.13 0800 \$22,429
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration  Topsoil, Furnish & Place, 6" Lifts, Off-site  Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	397 22	\$12 Subtot \$55 \$27 Otal, Site F	C.Y. al, Backfill C.Y. M.S.F.	\$5,088 \$21,000 \$21,835 \$594	ECHOS 02223 1001 \$21,240  ECHOS 18 05 0301  Means 32 92 19.13 0800  \$22,429  ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration  Topsoil, Furnish & Place, 6" Lifts, Off-site  Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.  Soil Stabilization	397 22 Subto	\$12 Subtot \$55 \$27 Otal, Site F	C.Y. al, Backfill  C.Y. M.S.F. Restoration	\$5,088 \$21,000 \$21,835 \$594 \$22,000	ECHOS 02223 1001 \$21,240 ECHOS 18 05 0301 Means 32 92 19.13 0800 \$22,429 ECHOS 17 03 0602; Assumes 100% of excavated
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration Topsoil, Furnish & Place, 6" Lifts, Off-site Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.  Soil Stabilization In-Situ Cement Stabilization, 6%	397 22 Subto	\$12 Subtot \$55 \$27 Otal, Site F	C.Yal, Backfill  C.Y M.S.F	\$5,088 \$21,000 \$21,835 \$594 \$22,000	ECHOS 02223 1001 \$21,240  ECHOS 18 05 0301  Means 32 92 19.13 0800  \$22,429  ECHOS 17 03 0602; Assumes 100% of excavater soil/sediment will require stabilization; Assumes level C.
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration  Topsoil, Furnish & Place, 6" Lifts, Off-site  Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.  Soil Stabilization  In-Situ Cement Stabilization, 6%  Transportation/Disposal	397 22 Subto	\$12 Subtot \$55 \$27 Otal, Site F \$34	C.Y. al, Backfill  C.Y. M.S.F.  Restoration  B.C.Y.	\$5,088 \$21,000 \$21,835 \$594 \$22,000 \$27,880	ECHOS 02223 1001 \$21,240  ECHOS 18 05 0301  Means 32 92 19.13 0800  \$22,429  ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes level C. \$27,880
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration Topsoil, Furnish & Place, 6" Lifts, Off-site Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.  Soil Stabilization In-Situ Cement Stabilization, 6%	397 22 Subto	\$12 Subtot \$55 \$27 Otal, Site F \$34	C.Y. al, Backfill  C.Y. M.S.F. Restoration	\$5,088 \$21,000 \$21,835 \$594 \$22,000 \$27,880	ECHOS 02223 1001 \$21,240  ECHOS 18 05 0301  Means 32 92 19.13 0800  \$22,429  ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes level C. \$27,880  SHA discussions with Waste Management, Inc.; Includes excavated material plus stabilizing additional stabilization stabilizing additional stabilization
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide  Unclassified Fill, Delivered, Off-site  Site Restoration  Topsoil, Furnish & Place, 6" Lifts, Off-site  Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.  Soil Stabilization  In-Situ Cement Stabilization, 6%  Transportation/Disposal  Asbestos-Impacted Soils, Non-Hazardous	397 22 Subto	\$12 Subtot \$55 \$27 Otal, Site F \$34 tal, Soil St	C.Y. al, Backfill  C.Y. M.S.F.  Restoration  B.C.Y.	\$5,088 \$21,000 \$21,835 \$594 \$22,000 \$27,880	ECHOS 02223 1001 \$21,240  ECHOS 18 05 0301  Means 32 92 19.13 0800  \$22,429  ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes 1 level C. \$27,880

Revision No.: 01 - DRAFT Date: October 2007 **Detailed Cost Estimate for** Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace

(Asbestos  $\geq$  1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

TON	OTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
TION Engineer	QII	COSIS	UNITS	COST	COMMENTS/REFERENCE
0	110	600	TT	¢10.000	A
Labor	110	\$99 \$1,634		\$10,890	Assumes 2 weeks of field work; See Note 3. Assumes 15% of labor cost
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$1,034	L.S.	\$1,034	Assumes 15% of labor cost
		Subtota	l, Engineer	\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	4	\$965	Ea.	\$3,860	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Lead Confirmatory	5	\$13	Ea.	\$65	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	10	\$50	Ea.	\$500	SHA discussions with EMSL Analytical, Inc.
	5	Subtotal, I	aboratory	\$4,400	\$4,425
Subtotal, Residenti	al Soil/S	ediment E	excavations	\$230,000	\$233,783
Contractor  Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Clamshell, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	\$305	Ea.	\$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes frac tank; Assumes Flevel D.
Subtotal,	Mobiliza	ation/Dem	obilization	\$4,700	\$4,674
Site Preparation					
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	150	\$4.28	L.F.	\$642	ECHOS 18 05 0206
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	150	-			
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts  Turbidity Curtains including Deployment	100	\$190		\$642 \$19,000 \$20,000	
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering	100 Subto	\$190 otal, Site P	L.Freparation	\$19,000 \$20,000	SHA discussions with Gunderboom, Inc. \$19,642
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom	100 <b>Subto</b>	\$190 otal, Site P	L.F. reparation	\$19,000 \$20,000 \$10,272	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C.
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader	100 <b>Subto</b>	\$190 otal, Site P \$642 \$204	L.F. reparation  Hr. Hr.	\$19,000 \$20,000 \$10,272 \$3,264	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C.
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader Bobcat	100 <b>Subto</b>	\$190 otal, Site P \$642 \$204 \$180	L.F. reparation  Hr. Hr.	\$19,000 \$20,000 \$10,272 \$3,264 \$2,880	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C. ECHOS Crew Code COBBC; Assumes H&S level
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader	100 Subto	\$190 <b>Sotal, Site P</b> \$642 \$204 \$180 \$87	L.F. reparation  Hr. Hr. Hr.	\$19,000 \$20,000 \$10,272 \$3,264 \$2,880 \$174	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C.

\$17,000

\$17,008

Subtotal, Dredging & Dewatering

**Detailed Cost Estimate for** 

Revision No.: 01 - DRAFT

Date: October 2007

Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) Feasibility Study

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%)

ΓΙΟΝ	OTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Wetlands Restoration	QII	00010	OMIS	COSI	COMMENTO/REFERENCE
(Includes restoration of additional 400 S.F. due to	construc	tion distu	rbance)		
1.5 CY Clamshell, with 60' Boom	16	\$435		\$6,960	ECHOS 17 03 0252
926, 2.0 CY, Wheel Loader	16	\$130			ECHOS 17 03 0222
Bobcat	16	\$112			ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	33		C.Y.		ECHOS 18 05 0301
Screened Leaf Compost, Delivered	25		C.Y.		SHA discussions with Agresource, Inc.
Trees, 2-3' CG - 15' on center, 5/M.S.F.	2	\$50			SHA discussions with Normandeau Associates, Inc.
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	6	\$20			SHA discussions with Normandeau Associates, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	1	\$30			SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	2		Pounds		SHA discussions with Normandeau Associates, Inc.
Conservation Seed Mix	1		Pounds		SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	1		Pounds		SHA discussions with Normandeau Associates, Inc.
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	275	\$5.00			SHA discussions with Normandeau Associates, Inc.
	8	\$5.00			SHA discussions with Normandeau Associates, Inc.;
Planting/Seeding Labor	0	\$00	nı.	\$320	ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	40	\$100	Hr.	\$4,000	SHA discussions with Normandeau Associates, Inc.; Assumes upto 5 site visits during and immediately following construction/restoration activities.
Surveying, 2-person Crew	2	\$2,950	Day	\$5,899	ECHOS 99 04 1201; Assumes H&S level C.
Cement Stabilization, 6%	50	\$32			
			2.6.1.	\$1,600	soil/sediment will require stabilization; Assumes H&
	Subtot	al, Soil St	abilization	\$1,600	soil/sediment will require stabilization; Assumes H& level C. \$1,600
Transportation/Disposal	Subtot	al, Soil St		. ,	soil/sediment will require stabilization; Assumes H&level C.
Transportation/Disposal Ashestos-Impacted Soils, Non-Hazardous			 tabilization	\$1,600	soil/sediment will require stabilization; Assumes H&level C. \$1,600
Transportation/Disposal Asbestos-Impacted Soils, Non-Hazardous	Subtot 93	al, Soil St	 tabilization	\$1,600	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.;
Asbestos-Impacted Soils, Non-Hazardous	93	\$125	Ton	\$1,600 \$11,625	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due
			Ton	\$1,600 \$11,625	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous	93 5,000	\$125 \$0.95	Ton	\$1,600 \$11,625	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous	93 5,000	\$125 \$0.95	Ton Gal.	\$1,600 \$11,625 \$4,750	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous	93 5,000	\$125 \$0.95	Ton Gal.  & Disposal	\$1,600 \$11,625 \$4,750 \$16,000	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.  \$16,375
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Subtota	93 5,000	\$125 \$0.95	Ton Gal.  & Disposal Contractor	\$1,600 \$11,625 \$4,750 \$16,000	soil/sediment will require stabilization; Assumes H& level C.  \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.  \$16,375
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Subtota  Engineer	93 5,000 al, Transp S	\$125 \$0.95 portation of Subtotal, (	Ton Gal.  & Disposal Contractor	\$1,600 \$11,625 \$4,750 \$16,000 \$85,000	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.  \$16,375 \$84,624
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Subtota  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal	93 5,000 al, Transp S	\$125 \$0.95 Sortation 6 Subtotal, 6 \$99 \$1,634	Ton Gal.  & Disposal Contractor	\$1,600 \$11,625 \$4,750 \$16,000 \$85,000	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Subtota  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal	93 5,000 al, Transp S	\$125 \$0.95 Sortation 6 Subtotal, 6 \$99 \$1,634	Ton Gal.  & Disposal Contractor	\$1,600 \$11,625 \$4,750 \$16,000 \$85,000 \$10,890 \$1,634	soil/sediment will require stabilization; Assumes H& level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3. Assumes 15% of labor cost
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Subtota  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory	93 5,000 al, Transp S	\$125 \$0.95 Sortation Subtotal, (999 \$1,634	Ton Gal. & Disposal Contractor  hr l.s.	\$1,600 \$11,625 \$4,750 \$16,000 \$85,000 \$10,890 \$1,634	soil/sediment will require stabilization; Assumes H& level C.  \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3. Assumes 15% of labor cost
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Subtota  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment	93 5,000 al, Transp S	\$125 \$0.95 Sortation 6 Subtotal, 6 \$99 \$1,634	Ton Gal. & Disposal Contractor  hr l.s.	\$1,600 \$11,625 \$4,750 \$16,000 \$85,000 \$10,890 \$1,634	soil/sediment will require stabilization; Assumes H&level C. \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3. Assumes 15% of labor cost
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Subtota  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory	93 5,000 al, Transp S	\$125 \$0.95 Sortation Subtotal, (999 \$1,634	Ton Gal.  & Disposal Contractor  hr l.s.  L, Engineer	\$1,600 \$11,625 \$4,750 \$16,000 \$85,000 \$10,890 \$1,634 \$13,000	soil/sediment will require stabilization; Assumes H& level C.  \$1,600  SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due SHA discussions with N.E. Environmental Solutions Inc.; Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3. Assumes 15% of labor cost

Subtotal, Former Mill Tailrace Excavation \$100,000 \$98,363

Revision No.: 01 - DRAFT Date: October 2007 **Detailed Cost Estimate for** 

Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) Feasibility Study

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), Subaqueous Can on Lewis Pond

RIPTION	sbestos ≥ 1%)		UNIT			
111 11011		QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Isolatio	n Cap Installation					
_						
Contrac						
	Mobilization/Demobilization	2	¢417	Б	<b>6024</b>	11 01513650 0030 1 50 1
M	Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
M	Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
M	Iob/Demob, Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
D	econtaminate Light Equipment	1	\$200	Ea	\$200	ECHOS 33 17 0801
	Decontaminate Medium Equipment	3	\$399			ECHOS 33 17 0802
	rew, 100 miles, per person	3	\$192			ECHOS 33 01 0204
				obilization =	\$4,100	\$4,137
	Subtota	i, 141001112	ation/Dem	obinzation	ψ1,100	Ψ1,137
Si	ite Preparation					
	learing, Medium Brush with Average Grub &	1.1	\$1,254	Acre	\$1 336	ECHOS 17 01 0103
So	ome Trees					
	rawler-mounted, 1.25 C.Y. 225 Hydraulic xcavator	16	\$299	Hr.	\$4,784	ECHOS 17 03 0231
В	obcat	16	\$126	Hr.	\$2,016	ECHOS Crew Code COBBC
		Subto	tal, Site P	reparation	\$8,100	\$8,136
			,			. ,
Is	solation Cap Placement					
	eotextile cover & fabric-formed grout filled	46,400	\$5.50	SF	\$255,200	J.F. Brennan Co., Inc. Cost Estimate dated August
	evetment mat placement	40,400	Ψ3.30	5.1 .	\$233,200	3.1 : Breiman Co., Inc. Cost Estimate dated August
		total Isal	ation Can	Placement	\$260,000	\$255,200
	540	totai, 150i	аноп Сар	1 lacement	\$200,000	\$233,200
	Vetlands Restoration					T.
	rawler-mounted, 1.25 C.Y. 225 Hydraulic xcavator	36	\$299	Hr.	\$10,764	ECHOS 17 03 0231
92	26, 2.0 CY, Wheel Loader	36	\$130	Hr.	\$4,680	ECHOS 17 03 0222
	obcat	36	\$126			ECHOS Crew Code COBBC
	oir Biolog plus butterfly anchors, 1'x 10' log	87	\$100			SHA discussions with Normandeau Associates, Inc
	opsoil, Furnish & Place, 6" Lifts, Off-site	566		C.Y.		ECHOS 18 05 0301
	creened Leaf Compost, Delivered	487		C.Y.		SHA discussions with Agresource, Inc.
	and/Gravel Fill for Streambed	294		C.Y.		ECHOS 17 03 0430
	rees, 2-3' CG - 15' on center, 5/M.S.F.	150	\$50			SHA discussions with Normandeau Associates, Inc
						-
	hrubs, 18-24" CG - 8' on center, 15/M.S.F.	450	\$20			SHA discussions with Normandeau Associates, Inc
	ertilizer Tablets, 1/plant, 250 count per box	3	\$30			SHA discussions with Normandeau Associates, Inc
	Vetland Seed Mix	37		Pounds		SHA discussions with Normandeau Associates, Inc
	onservation Seed Mix	6		Pounds		SHA discussions with Normandeau Associates, Inc
	nnual Rye Grass	28		Pounds		SHA discussions with Normandeau Associates, Inc
A	quatic Plants, 2' on center, wetland, 250/M.S.F.	200	\$5.00	Ea.	\$1,000	SHA discussions with Normandeau Associates, Inc
	lanting/Seeding Labor	48	\$66	Hr.	\$3,168	SHA discussions with Normandeau Associates, Inc
		96	\$100	Hr	\$9,600	ECHOS Crew Code ULABA SHA discussions with Normandeau Associates, Inc.
W	Vetlands Specialist Construction Oversight				Ψ>,000	Assumes up to 8 site visits during and immediately
W	Vetlands Specialist, Construction Oversight		,			following construction/restoration activities.
		5		Day	\$10,114	following construction/restoration activities.
	urveying, 2-person Crew	5	\$2,023			following construction/restoration activities.  ECHOS 99 04 1201
	urveying, 2-person Crew	5 Subtotal, V	\$2,023 Vetlands F	Restoration	\$120,000	following construction/restoration activities.  ECHOS 99 04 1201  \$118,426
	urveying, 2-person Crew	5 Subtotal, V	\$2,023 Vetlands F			following construction/restoration activities.  ECHOS 99 04 1201
Si	urveying, 2-person Crew	5 Subtotal, V	\$2,023 Vetlands F	Restoration	\$120,000	following construction/restoration activities.  ECHOS 99 04 1201  \$118,426
Si Enginee	urveying, 2-person Crew S	5 ubtotal, V	\$2,023 Vetlands F Subtotal, (	Restoration Contractor	\$120,000 \$390,000	following construction/restoration activities.  ECHOS 99 04 1201  \$118,426 \$385,899
Enginee L	urveying, 2-person Crew	5 Subtotal, V	\$2,023 Vetlands F	Restoration Contractor Hr.	\$120,000 \$390,000 \$21,780	following construction/restoration activities.  ECHOS 99 04 1201  \$118,426

**Subtotal, Isolation Cap Installation** \$410,000 \$410,946

Revision No.: 01 - DRAFT Date: October 2007 **Detailed Cost Estimate for** 

Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%) Feasibility Study

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis

		UNIT			
CRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Post-Construction Submittals/As-Builts	1	\$37,000	Ea.	\$37,000	SHA estimate
Sub	ototal, Co	nstruction	n Activities	\$850,000	
Scope Contingency (15% Construction Activities Subtotal)				\$130,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)  Subtotal, Construction	Activitie	s with Co	ntingencies	\$130,000 <b>\$1,100,000</b>	OSWER 5-6: Assume 15% of Construction Activities Subtotal
	Activitie	s with Co	ntingencies		
	Activitie	s with Co	ntingencies	\$1,100,000	
Subtotal, Construction  Professional/Technical Services  Project Management (6% Construction Activities Subtotal w/Contingencies)	Activitie	s with Cor	ntingencies	<b>\$1,100,000</b> <b>\$70,000</b>	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Subtotal, Construction  Professional/Technical Services  Project Management (6% Construction Activities	Activitie	s with Con	ntingencies	<b>\$1,100,000</b> <b>\$70,000</b>	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities
Subtotal, Construction  Professional/Technical Services  Project Management (6% Construction Activities Subtotal w/Contingencies)  Remedial Design (12% Construction Activities Subtotal w/Contingencies)  Construction Management (8% Construction Activities	Activitie	s with Co	ntingencies	<b>\$1,100,000</b> <b>\$70,000</b>	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 8% of Construction Activities
Subtotal, Construction  Professional/Technical Services  Project Management (6% Construction Activities Subtotal w/Contingencies)  Remedial Design (12% Construction Activities Subtotal w/Contingencies)				\$1,100,000 \$70,000 \$132,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies

H.n	oin	eei
	D	

Establish Institutional Controls in the form of Deed	7	\$5,000	Ea.	\$35,000	Costs estimated based on number of properties requiring
Restrictions					deed restrictions.
		Subtotal	, Engineer	\$35,000	\$35,000

\$35,000 **Subtotal, Establish Deed Restrictions** \$35,000

\$35,000 **Subtotal, Institutional Controls** 

TOTAL, CAPITAL COSTS \$1,400,000

### ANNUAL O&M COSTS

### **O&M** Activities

### **Isolation Cap Maintenance**

Mobilization/Demobilization					
Crew, 100 miles, per person	3	\$192	Ea.	\$576	ECHOS 33 01 0204
Mob/Demob, Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per
					mob/demob.
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
Subtota	ıl, Mobiliza	tion/Dem	obilization	\$880	\$880
	-			. ,	
Cap Maintanence/Repairs Bobcat	8	\$126	Hr.	\$1,008	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	10		C.Y.		ECHOS 18 05 0301
Screened Leaf Compost, Delivered	10	\$17	C.Y.	\$170	SHA discussions with Agresource, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	3	\$30	Ea.	\$90	SHA discussions with Normandeau Associates, Inc
Wetland Seed Mix	2	\$75	Pounds	\$150	SHA discussions with Normandeau Associates, Inc
Conservation Seed Mix	1	\$50	Pounds	\$50	SHA discussions with Normandeau Associates, Inc
Annual Rye Grass	2	\$1.00	Pounds	\$2	SHA discussions with Normandeau Associates, Inc
i iiii uu i kye Giuss	8	\$66	Hr.	\$528	SHA discussions with Normandeau Associates, Inc
Planting/Seeding Labor	0				
					ECHOS Crew Code ULABA
Planting/Seeding Labor		<b>Iaintenan</b>	ce/Repairs	\$2,500	ECHOS Crew Code ULABA \$2,548

**Detailed Cost Estimate for** 

Date: October 2007 Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos  $\geq$  1%)

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\$1,400 OSWER 5-6: Assume 15% of Periodic O&M Activities

\$1,400 OSWER 5-6: Assume 15% of Periodic O&M Activities

Subtotal

Subtotal

Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis

DESCRIPTION	OTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer	<b>C</b>				
Labor	10	\$99	Hr.	\$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$149	L.S.	\$149	Assumes 15% of labor cost
		Subtotal	l, Engineer	\$1,100	\$1,139
Subtot	al, Isolati	on Cap M	aintenance	\$4,600	\$4,567
	Subto	otal, O&N	1 Activities	\$4,600	
Scope Contingency (15% Annual O&M Activities Subtotal)				\$690	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Bid Contingency (15% Annual O&M Activities Subtotal)				\$690	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Subtotal, O&M	Activitie	s with Co	ntingencies	\$6,000	
Professional/Technical Services					
Project Management (10% O&M Activities Subtotal w/Contingencies)				\$600	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
Technical Support (15% O&M Activities Subtotal w/Contingencies)				\$900	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, P	rofessiona	al/Technic	al Services	\$1,500	-
тот	TAL, ANN	NUAL O&	M COSTS	\$7,500	
ERIODIC COSTS					
O&M Activities					
Year 1 Only O&M Activities					
Post-Reconstruction Wetlands Monitoring (year 1 only	·)				
Contractor					
Post-Construction Wetlands Monitoring	1	\$9,600	L.S.	\$9,600	SHA discussions with Normandeau Associates, Inc.; Assumes up to 3 post-reconstruction site visits to occur during the following two growing seasons and summa report preparation.
		Subtotal, (	Contractor	\$9,600	\$9,600
Subtotal, Post-Reconstruction Wetl	ands M	itoui /	nou 1 a-1)	\$9,600	\$9,600

Subtotal, Year 1 Only O&M Activities with Contingencies \$12,000

> Subtotal, O&M Activities \$12,000

Subtotal)

Subtotal)

Scope Contingency (15% Year 1 Only O&M Activities

Bid Contingency (15% Year 1 Only O&M Activities

Revision No.: 01 - DRAFT Date: October 2007 **Detailed Cost Estimate for** 

Alternative SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq 1\%$ , and Pb on Lot 33-257), Engineered Cap on Lewis Pond Sediment (Asbestos  $\geq 1\%$ ) Feasibility Study

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-4: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), Subaqueous Cap on Lewis Pond Sediment (Asbestos ≥ 1%) IINIT

			UNIT			
DESCRIPTION		QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Te	chnical Services					
Project Ma	anagement (10% O&M Activities Subtotal				\$1,200	OSWER 5-8: Assume 10% of O&M Activities Subtotal
w/Conting	gencies)					including contingencies
Technical	Support (15% O&M Activities Subtotal				\$1,800	OSWER 5-8: Assume 15% of O&M Activities Subtotal
w/Conting	gencies)					including contingencies
Engineer						
Engineer						
Labo	or	1	\$12,400	L.S.	\$12,400	Unit cost assumes 100 labor hours at an average rate of
						\$124/hr. See Note 3.
Mise	c Expenses (e.g., reproduction, telephone,	1	\$620	L.S.	\$620	Assume 5% of labor costs.
post	age, etc.)			_		
			Subtotal	l, Engineer	\$13,000	\$13,020
		Subtot	al, Five-Yo	ear Review	\$13,000	\$13,020
	Subtotal, I	Profession	al/Technic	al Services	\$16,000	
	Subtotui, i					

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hourL.S. = lump sump S.F. = square feet C.Y. = cubic yards L.C.Y. = loose cubic yards Mo. = month S.Y. = square yard

Ea. = each L.F. = linear feet M.S.F. = thousand square feet

#### Notes:

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition. RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition. ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the former mill tailrace quantity estimates:
  - a.) We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y. volume.
  - b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
  - c.) We assumed 1 cubic yard of dredged and dewatered sediments weighs approximately 1.75 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.

## Appendix D-4d

**Cost Estimates for Alternative SSW-5** 

### **Cost Estimate Summary for**

Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%) **Feasibility Study** 

### **Blackburn & Union Privileges Superfund Site** Walpole, Massachusetts

### **CAPITA**

Implementation Plans/Submittals	\$100,000
Residential Soil/Sediment Excavations	
Contractor	
Mobilization/Demobilization	\$4,90
Site Preparation	\$2,60
Excavation	\$34,00
Backfill	\$21,00
Site Restoration	\$22,00
Soil Stabilization	\$28,00
Transportation/Disposal	\$100,00
Subtotal, Contractor	\$220,00
Engineer	\$13,00
Laboratory	\$4,40
Subtotal, Residential Soil/Sediment Excavations	\$230,00
Former Mill Tailrace Excavation	
Contractor	
Mobilization/Demobilization	\$4,70
Site Preparation	\$20,00
Dredging & Dewatering	\$17,00
Wetlands Restoration	\$25,00
Soil Stabilization	\$1,60
Transportation/Disposal	\$16,00
Subtotal, Contractor	\$85,00
Engineer	\$13,00
Laboratory	\$1,20
Subtotal, Former Mill Tailrace Excavation	\$100,00
Lewis Pond Dredging	
Contractor	
Mobilization/Demobilization	\$14,00
Site Preparation	\$18,00
Dredging & Dewatering	\$290,00
Site Restoration (Temporary Access Road Removal/Restoration)	\$14,00
Wetlands Restoration	\$130,00
Soil Stabilization	\$120,00
Transportation/Disposal	\$920,00
Subtotal, Contractor	\$1,500,00

### **Cost Estimate Summary for**

Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%) Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

Engineer	\$38,000
Laboratory	\$15,000
Subtotal, Lewis Pond Dredging	\$1,500,000
Post-Construction Submittals/As-Builts	\$50,000
Subtotal, Construction Activities	\$2,000,000
Scope Contingency (15% Construction Activities Subtotal)	\$300,000
Bid Contingency (15% Construction Activities Subtotal)	\$300,000
Subtotal, Construction Activities with Contingencies	\$2,600,000
Professional/Technical Services	
Project Management (5% Construction Activities Subtotal w/Contingencies)	\$130,000
Remedial Design (8% Construction Activities Subtotal w/Contingencies)	\$210,000
Construction Management (6% Construction Activities Subtotal w/Contingencies)	\$160,000
Subtotal, Professional/Technical Services	\$500,000
TOTAL, CAPITAL COSTS	\$3,100,000
PERIODIC COSTS	
O&M Activities	
Year 1 Only O&M Activities	
Post-Reconstruction Wetlands Monitoring (year 1 only)	\$9,600
Subtotal, Year 1 Only O&M Activities	\$9,600
Scope Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,400
Bid Contingency (15% Year 1 Only O&M Activities Subtotal)	\$1,400
Subtotal, Year 1 Only O&M Activities with Contingencies	\$12,000
Subtotal, O&M Activities	\$12,000
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	\$1,200
Technical Support (15% O&M Activities Subtotal w/Contingencies)	\$1,800
Subtotal, Professional/Technical Services	\$3,000
TOTAL, PERIODIC COSTS	\$15,000

### **Cost Estimate Summary for**

Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%) Feasibility Study

# Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

### PRESENT VALUE ANALYSIS

Type of Cost	<u>Year</u>	Total Cost	Total Cost Per Year	<u>Discount</u> <u>Factor</u>	<u>Present Value</u>
Capital Costs	0	\$3,100,000	\$3,100,000	1	\$3,100,000
Periodic Costs	1	\$15,000	\$15,000	0.935	\$14,000

### TOTAL PRESENT VALUE OF ALTERNATIVE

\$3,100,000

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

Revision No.: 01 - DRAFT **Detailed Cost Estimate for** Date: October 2007 Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%)

### Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

RIPTION AL COSTS	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
onstruction Activities Implementation Plans/Submittals	1	\$100,000	Ea.	\$100,000	SHA estimate
Residential Soil/Sediment Excavations					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader, Compactor 70 to 150 HP	4	\$417	Ea.	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	\$199	Ea.	\$199	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H level D.
Subt	total, Mobil	ization/Dem	obilization	\$4,900	\$4,897
CI. D					
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with	600	\$4.28	L.F.	\$2,568	ECHOS 18 05 0206
7.5' posts	Sub	total, Site P	reperation	\$2,600	\$2,568
	Sub	total, Site I	i epai ation	\$2,000	\$2,500
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	40	\$299	Hr.	\$11,960	ECHOS 17 03 0231; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	40	\$204	Hr.	\$8,160	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	40	\$180	Hr.		ECHOS Crew Code COBBC; Assumes H&S level C.
Water Truck	40	\$103	Hr.	\$4,896	ECHOS Crew Code COKBM (Modified); Assumes H level C.
Sprayed Water Dust Suppressant	21,400	\$0.06	S.F.	\$1,284	ECHOS 33 08 0585; Assumes H&S level C.
		Subtotal, l	Excavation	\$34,000	\$33,500
Doole Ell					
Backfill Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	\$199	Hr.	\$4,776	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	24	\$130	Hr.	\$3.120	ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24	\$344			ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	424	\$12	C.Y.	\$5,088	ECHOS 02223 1001
		Subtot	al, Backfill	\$21,000	\$21,240
Site Restoration					
Topsoil, Furnish & Place, 6" Lifts, Off-site	397		C.Y.		ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	22	\$27	M.S.F.	\$594	Means 32 92 19.13 0800
spreader, the too per tribut.	Sub	ototal, Site F	Restoration	\$22,000	\$22,429
Soil Stabilization					
In-Situ Cement Stabilization, 6%	820	\$34	B.C.Y.	\$27,880	ECHOS 17 03 0602; Assumes 100% of excavated
, ,				, ,,,,,	soil/sediment will require stabilization; Assumes H&S level C.
	Sub	total, Soil St	tabilization	\$28,000	\$27,880
Transpartation/Disparal					
Transportation/Disposal Asbestos-Impacted Soils, Non-Hazardous	1,304	082	Ton	\$104,320	SHA discussions with Waste Management, Inc.; Inclu
risocsios-impacica Jons, non-mazaidous	1,504	φου	1011	φ104,320	excavated material plus stabilizing additive at 6%.
Su	btotal, Tran	sportation	& Disposal	\$100,000	\$104,320

Revision No.: 01 - DRAFT **Detailed Cost Estimate for** Date: October 2007 Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%)

Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

IPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer		***		***	
Labor Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	110	\$99 \$1,634		1 - 7	Assumes 2 weeks of field work; See Note 3. Assumes 15% of labor cost
etc.)		Subtota	, Engineer	\$13,000	\$12,524
Laboratory					
Chemical analysis, Soil Management Assessment Package I	4	\$965	Ea.	\$3,860	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Lead Confirmatory	5	\$13	Ea.	\$65	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	10	\$50			SHA discussions with EMSL Analytical, Inc.
Cholinear analysis, 1 isoesios comminatory		Subtotal, I	_	\$4,400	\$4,425
Former Mill Tailrace Excavation  Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	\$417	Ea.	\$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Clamshell, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	\$104	Ea.	\$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	\$305	Ea.	\$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	\$200	Ea.		ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	\$399	Ea.	\$1,596	ECHOS 33 17 0802; Includes frac tank; Assumes Helevel D.
Subt	otal, Mobili	ization/Dem	obilization	\$4,700	\$4,674
Site Preparation					
Site Preparation Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	150	\$4.28	L.F.	\$642	ECHOS 18 05 0206
Erosion Control, Silt Fences, Vinyl, 3' high with	150 100	\$4.28 \$190			ECHOS 18 05 0206 SHA discussions with Gunderboom, Inc.
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts  Turbidity Curtains including Deployment	100		L.F.		
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering	100 Subt	\$190 total, Site P	L.F reparation	\$19,000 \$20,000	SHA discussions with Gunderboom, Inc. \$19,642
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom	100 Subt	\$190 total, Site P	L.F. reparation	\$19,000 \$20,000 \$10,272	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C.
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader	100 Subt	\$190 total, Site P \$642 \$204	L.F. reparation  Hr. Hr.	\$19,000 \$20,000 \$10,272 \$3,264	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C.
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader Bobcat	100 Subt	\$190 total, Site P \$642 \$204 \$180	L.F. reparation  Hr. Hr. Hr.	\$19,000 \$20,000 \$10,272 \$3,264 \$2,880	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C. ECHOS Crew Code COBBC; Assumes H&S level C
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader Bobcat 10,000 gal Fractionation Tank (coated interior)	100 Subtained 16 16 16 2	\$190 total, Site P \$642 \$204 \$180 \$87	L.F. reparation  Hr. Hr. Hr. Week	\$19,000 \$20,000 \$10,272 \$3,264 \$2,880 \$174	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C. ECHOS Crew Code COBBC; Assumes H&S level C. Rain for Rent, Inc. Quote dated 09/20/07
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts Turbidity Curtains including Deployment  Dredging & Dewatering 1.5 CY Clamshell, with 60' Boom 926, 2.0 CY, Wheel Loader Bobcat	100 Subt	\$190 total, Site P \$642 \$204 \$180 \$87 \$125	L.F. reparation  Hr. Hr. Hr.	\$19,000 \$20,000 \$10,272 \$3,264 \$2,880 \$174 \$250	SHA discussions with Gunderboom, Inc. \$19,642  ECHOS 17 03 0252; Assumes H&S level C. ECHOS 17 03 0222; Assumes H&S level C. ECHOS Crew Code COBBC; Assumes H&S level C

**Detailed Cost Estimate for** 

Date: October 2007 Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%)

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Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%) UNIT

		UNIT			
TION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Wetlands Restoration					
1.5 CY Clamshell, with 60' Boom	16	\$435			ECHOS 17 03 0252
926, 2.0 CY, Wheel Loader	16	\$130			ECHOS 17 03 0222
Bobcat	16	\$112			ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	33		C.Y.		ECHOS 18 05 0301
Screened Leaf Compost, Delivered	25	\$17	C.Y.	\$425	SHA discussions with Agresource, Inc.
Trees, 2-3' CG - 15' on center, 5/M.S.F.	2	\$50			SHA discussions with Normandeau Associates, Inc.
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	6		Ea.		SHA discussions with Normandeau Associates, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	1	\$30	Ea.	\$30	SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	2	\$75	Pounds		SHA discussions with Normandeau Associates, Inc.
Conservation Seed Mix	1		Pounds		SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	1	\$1.00	Pounds	\$1	SHA discussions with Normandeau Associates, Inc.
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	275	\$5.00	Ea.	\$1,375	SHA discussions with Normandeau Associates, Inc.
Planting/Seeding Labor	8	\$66	Hr.	\$528	SHA discussions with Normandeau Associates, Inc.; ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	40	\$100	Hr.	\$4,000	SHA discussions with Normandeau Associates, Inc.; Assumes upto 5 site visits during and immediately following construction/restoration activities.
Surveying, 2-person Crew	2	\$2,950	Day	\$5 800	ECHOS 99 04 1201; Assumes H&S level C.
Surveying, 2-person crew		Wetlands F		\$25,000	\$25,325
Cement Stabilization, 6%	50	\$32	B.C.Y.	\$1,600	ECHOS 17 03 0602; Assumes 100% of excavated
					soil/sediment will require stabilization; Assumes H&S level C.
	Sub	total, Soil St	tabilization	\$1,600	level C.
	Sub	total, Soil St	tabilization	\$1,600	
Transportation/Disposal	Sub	total, Soil St	tabilization	\$1,600	level C.
Transportation/Disposal Asbestos-Impacted Soils, Non-Hazardous	Subt	s125		. ,	level C. \$1,600  SHA discussions with Waste Management, Inc.; Include
			Ton	. ,	level C. \$1,600  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous	5,000	\$125 \$0.95	Ton Gal.	\$11,625	SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, I
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous	5,000	\$125 \$0.95	Ton Gal. & Disposal	\$11,625 \$4,750 \$16,000	level C. \$1,600  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, I Assumes no pre-treatment of water.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous	5,000	\$125 \$0.95	Ton Gal.	\$11,625 \$4,750	level C. \$1,600  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, I Assumes no pre-treatment of water.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub	5,000	\$125 \$0.95	Ton Gal. & Disposal	\$11,625 \$4,750 \$16,000	level C. \$1,600  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, I Assumes no pre-treatment of water.  \$16,375
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer	5,000 ototal, Tran	\$0.95	Ton Gal. & Disposal Contractor	\$11,625 \$4,750 \$16,000 \$85,000	level C. \$1,600  SHA discussions with Waste Management, Inc.; Incluadditional roll-off delivery/pickup costs due to dewate activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes the stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes the stabilizing additive at 6%.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer  Labor	5,000	\$0.95 sportation Subtotal, (	Ton Gal. & Disposal Contractor	\$11,625 \$4,750 \$16,000 \$85,000	level C. \$1,600  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewate activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes the stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes the stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes the stabilizing additive at 6%.  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes the stabilizing additive at 6%.  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes the stabilizing additive at 6%.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal	93 5,000 ototal, Tran	\$0.95	Ton Gal. & Disposal Contractor	\$11,625 \$4,750 \$16,000 \$85,000	level C. \$1,600  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes the stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes the stabilizing additive at 6%.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	93 5,000 ototal, Tran	\$0.95 sportation Subtotal, (	Ton Gal. & Disposal Contractor	\$11,625 \$4,750 \$16,000 \$85,000	level C. \$1,600  SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, I Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal	93 5,000 ototal, Tran	\$0.95 sportation Subtotal, 6 \$99 \$1,634	Ton Gal. & Disposal Contractor hr l.s.	\$11,625 \$4,750 \$16,000 \$85,000 \$10,890 \$1,634	SHA discussions with Waste Management, Inc.; Include additional roll-off delivery/pickup costs due to dewate activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, I Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	93 5,000 ototal, Tran	\$0.95 sportation Subtotal, 6 \$99 \$1,634	Ton Gal. & Disposal Contractor	\$11,625 \$4,750 \$16,000 \$85,000	level C. \$1,600  SHA discussions with Waste Management, Inc.; Incluadditional roll-off delivery/pickup costs due to dewate activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3.
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone,	93 5,000 ototal, Tran	\$0.95 sportation Subtotal, 6 \$99 \$1,634	Ton Gal. & Disposal Contractor hr l.s.	\$11,625 \$4,750 \$16,000 \$85,000 \$10,890 \$1,634	SHA discussions with Waste Management, Inc.; Inclu additional roll-off delivery/pickup costs due to dewate activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory  Chemical analysis, Soil Management Assessment	93 5,000 ototal, Tran	\$0.95 sportation Subtotal, 6 \$99 \$1,634	Ton Gal. & Disposal Contractor hr l.s.	\$11,625 \$4,750 \$16,000 \$85,000 \$10,890 \$1,634	SHA discussions with Waste Management, Inc.; Included ditional roll-off delivery/pickup costs due to dewate activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes devated assumes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost
Asbestos-Impacted Soils, Non-Hazardous  Water, Asbestos-Impacted, Non-Hazardous  Sub  Engineer  Labor  Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)  Laboratory	93 5,000 ototal, Tran	\$0.95 sportation Subtotal, 6 \$99 \$1,634	Ton Gal. & Disposal Contractor hr l.s. I, Engineer	\$11,625 \$4,750 \$16,000 \$85,000 \$10,890 \$1,634 \$13,000	level C. \$1,600  SHA discussions with Waste Management, Inc.; Included additional roll-off delivery/pickup costs due to dewater activities; Includes dewatered dredged material plus stabilizing additive at 6%.  SHA discussions with N.E. Environmental Solutions, Includes no pre-treatment of water.  \$16,375 \$84,624  Assumes 10 days of field work; See Note 3.  Assumes 15% of labor cost

Subtotal, Former Mill Tailrace Excavation

\$100,000

\$98,363

Revision No.: 01 - DRAFT **Detailed Cost Estimate for** Date: October 2007 Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%)

### Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq 1\%$ )

PTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Lewis Pond Dredging					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader, Compactor, 70 to 150 HP	4	\$417	Fa	\$1,668	Means 01 54 36.50 0020; Assumes 50 miles per
Wood Belliot, Bouder, Compactor, 70 to 150 H	•	Ψ117	Lu.	Ψ1,000	mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	\$613	Ea.	\$1,226	Means 01 54 36.50 0100; Assumes 50 miles per
,,				, ,	mob/demob.
Mob/Demob, Small Equipment	1	\$104	Ea.	\$104	Means 01 54 36.50 1100; Assumes 50 miles per
					mob/demob.
Mob/Demob, Fractionation Tank	18	\$305	Ea.	\$5,490	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	\$200	Ea.	\$200	ECHOS 33 17 0801
Decontaminate Medium Equipment	12	\$399	Ea.	\$4,788	ECHOS 33 17 0802; Includes frac tanks
Crew, 100 miles, per person	5	\$192			ECHOS 33 01 0204
Subt	otal, Mobil	ization/Den	obilization	\$14,000	\$14,436
Site Preparation			1.		
Clearing, Medium Brush with Average Grub &	0.3	\$1,254	Acre	\$376	ECHOS 17 01 0103; Assumes 9,670 S.F. will be cleared
Some Trees	1.055		0.17	417.200	at same level of effort as 0.3 acre.
Temporary Roads, gravel fill, no surfacing, 8"	1,075	\$16	S.Y.	\$17,200	Means 01 55 23.50 0100
gravel depth	~ .			410.000	017.576
	Sub	total, Site P	reparation	\$18,000	\$17,576
D					
Dredging & Dewatering  Mechanical Dredging, 2 CY Hydraulic Excavator	1	\$270,000	I C	\$270,000	J.F. Brennan Co., Inc. Cost Estimate dated July 2007;
with RTK GPS, 950 3.0 CY, Wheel Loader,	1	\$270,000	L.S.	\$270,000	Includes erosion and sediment controls
Bobcat, & Small Equipment					includes crosion and sediment controls
21,000 gal Fractionation Tanks (coated interior); 2-	9	\$648	Ee	\$5.922	Rain for Rent, Inc. Quote dated 09/20/07
Month Rental	9	\$048	Ea.	\$3,832	Rain for Rent, file. Quote dated 09/20/07
3" Trash Pump with Fittings; 2-Month Rental	2	\$750	Fa	\$1.500	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet; 2-Month Rental	2	\$504			Rain for Rent, Inc. Quote dated 09/24/07  Rain for Rent, Inc. Quote dated 09/24/07
Filtration system, 4-stage tandem unit, 200 gpm	2		Month		SHA discussions with N.E. Environmental Solutions, Inc.
r indution system, 4 stage tandem unit, 200 gpm	-	Ψ2,000	Month	ψ5,000	STIT discussions with 14.2. Environmental solutions, in
Filtration system hoses	2	\$400	Month	\$800	SHA discussions with N.E. Environmental Solutions, Inc
	_	+		4000	, , , , , , , , , , , , , , , , , , , ,
Filtration system pumps, 2" submersibles	2	\$800	Month	\$1,600	SHA discussions with N.E. Environmental Solutions, Inc
1 1 ,					· ·
Filters	240	\$8.00	Ea.	\$1,920	SHA discussions with N.E. Environmental Solutions, In-
		Subtotal,	Excavation	\$290,000	\$288,260
Site Restoration (Temporary Access Road Remo	val/Restora	tion)			
Crawler-mounted, 2.0 C.Y. 225 Hydraulic	8	\$282	Hr.	\$2,256	ECHOS 17 03 0232
Excavator					
926, 2.0 CY, Wheel Loader	8	\$130			ECHOS 17 03 0222
Bobcat	8	\$112		\$896	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	180	\$55	C.Y.		ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push	10	\$27	M.S.F.	\$270	Means 32 92 19.13 0800

Subtotal, Site Restoration

\$14,000

\$14,362

spreader, 4.5 lbs per M.S.F.

Revision No.: 01 - DRAFT **Detailed Cost Estimate for** Date: October 2007 Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%)

### Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

PTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Wetlands Restoration					
Crawler-mounted, 2.0 C.Y. 225 Hydraulic Excavator	36	\$282	Hr.	\$10,152	ECHOS 17 03 0232
950, 3.0 CY, Wheel Loader	36	\$135	Hr.	\$4,860	ECHOS 17 03 0223
Bobcat	36	\$112	Hr.	\$4,032	ECHOS Crew Code COBBC
Unclassified Fill, Delivered, Off-site	2,174	\$12	C.Y.	\$26,088	ECHOS 02223 1001
Topsoil, Furnish & Place, 6" Lifts, Off-site	566	\$55	C.Y.	\$31,130	ECHOS 18 05 0301
Screened Leaf Compost, Delivered	566	\$17	C.Y.	\$9,622	SHA discussions with Agresource, Inc.
Sand/Gravel Fill for Streambed	294	\$23	C.Y.	\$6,762	ECHOS 17 03 0430
Trees, 2-3' CG - 15' on center, 5/M.S.F.	22	\$50	Ea.	\$1,100	SHA discussions with Normandeau Associates, In
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	64	\$20	Ea.	\$1,280	SHA discussions with Normandeau Associates, In
Fertilizer Tablets, 1/plant, 250 count per box	1	\$30	Ea.	\$30	SHA discussions with Normandeau Associates, In-
Wetland Seed Mix	41	\$75	Pounds	\$3,075	SHA discussions with Normandeau Associates, In-
Annual Rye Grass	28	\$1.00	Pounds	\$28	SHA discussions with Normandeau Associates, In
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	3,390	\$5.00	Ea.	\$16,950	SHA discussions with Normandeau Associates, In
Planting/Seeding Labor	48	\$66	Hr.	\$3,168	SHA discussions with Normandeau Associates, In ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	96	\$100	Hr.	\$9,600	SHA discussions with Normandeau Associates, In Assumes up to 12 site visits during and immediate following construction/restoration activities.
Surveying, 2-person Crew	5	\$2,023	Day	\$10 114	ECHOS 99 04 1201
Surveying, 2 person erew		, Wetlands I		\$130,000	\$127,839
	Subtotal	, wettands i	ecstor ation	Ψ130,000	φ127,009
Soil Stabilization					
Cement Stabilization, 6%	3,600	\$32	B.C.Y.	\$115,200	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization.
	Sub	total, Soil S	tabilization	\$120,000	\$115,200
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	6,678	\$125	Ton	\$834,750	SHA discussions with Waste Management, Inc.; In additional roll-off delivery/pickup costs due to devactivities; Includes dewatered dredged material plustabilizing additive at 6%.
Water, Asbestos-Impacted, Non-Hazardous	361,000	\$0.20	Gal.	\$72,200	SHA discussions with N.E. Environmental Solution
Temporary Road Fill Material	358	\$25	Ton	\$8 954	SHA discussions with Waste Management, Inc.
		nsportation		\$920,000	\$915,904
St	ibibitai, ITai	-	Contractor	\$1,500,000	\$1,479,215
Engineer					
Labor	330	\$99		\$32,670	Assumes 6 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	\$4,901			Assumes 15% of labor cost
		Subtota	l, Engineer	\$38,000	\$37,571
Laboratory					
Chemical analysis, Soil Management Assessment Package I	13	\$965	Ea.	\$12,545	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	50	\$50	Ea.	\$2.500	SHA discussions with EMSL Analytical, Inc.
	וור			Ψ=,5000	murjuou, mu
Chemical analysis, Asoestos Comminatory	50	Subtotal, I	aboratory	\$15,000	\$15,045
Cicinical analysis, Assestos Comminatory			·	\$15,000 <b>\$1,500,000</b>	\$15,045 \$1,531,831
Post-Construction Submittals/As-Builts		Subtotal, I	d Dredging	\$1,500,000	
	Subtotal	Subtotal, I , Lewis Pond	d Dredging Ea.	\$1,500,000	\$1,531,831
Post-Construction Submittals/As-Builts  Scope Contingency (15% Construction Activities	Subtotal	Subtotal, I , Lewis Pone \$50,000	d Dredging Ea.	\$1,500,000 \$50,000	\$1,531,831 SHA estimate OSWER 5-6: Assume 15% of Construction Activi
Post-Construction Submittals/As-Builts	Subtotal	Subtotal, I , Lewis Pone \$50,000	d Dredging Ea.	\$1,500,000 \$50,000 \$2,000,000	\$1,531,831  SHA estimate  OSWER 5-6: Assume 15% of Construction Activi Subtotal

**Detailed Cost Estimate for** 

Date: October 2007 Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%) Feasibility Study

Revision No.: 01 - DRAFT

Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in L

ESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (5% Construction Activities Subtotal w/Contingencies)				\$130,000	OSWER 5-8: Assume 5% of Construction Activities Subtotal including contingencies
Remedial Design (8% Construction Activities Subtotal w/Contingencies)				\$210,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Construction Management (6% Construction Activities Subtotal w/Contingencies)				\$160,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Subtota	l, Professio	onal/Technic	al Services	\$500,000	
	TOT	AL, CAPIT <i>a</i>	A COSTS	\$3,100,000	1
DVODVG GOGTG					
RIODIC COSTS  O&M Activities  Year 1 Only O&M Activities					
O&M Activities	y)				
O&M Activities Year 1 Only O&M Activities  Post-Reconstruction Wetlands Monitoring (year 1 only  Contractor	<b>y</b> )				
O&M Activities Year 1 Only O&M Activities  Post-Reconstruction Wetlands Monitoring (year 1 only	<b>y)</b>	\$9,600	L.S.	\$9,600	
Year 1 Only O&M Activities  Post-Reconstruction Wetlands Monitoring (year 1 only Contractor	y) 1	,,,,,,	L.S.	\$9,600	Assumes up to 3 post-reconstruction site visits to occur during the following two growing seasons and summa

Subtotal, Year 1 Only O&M Activities with Contingencies \$12,000

Subtotal, Year 1 Only O&M Activities

Scope Contingency (15% Year 1 Only O&M Activities

Bid Contingency (15% Year 1 Only O&M Activities

Subtotal)

Subtotal)

Subtotal, O&M Activities \$12,000

\$9,600

Subtotal

\$1,400 OSWER 5-6: Assume 15% of Periodic O&M Activities

\$1,400 OSWER 5-6: Assume 15% of Periodic O&M Activities

**Detailed Cost Estimate for** 

Date: October 2007 Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos  $\geq$  1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos  $\geq$  1%)

Revision No.: 01 - DRAFT

Feasibility Study Blackburn & Union Privileges Superfund Site Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

Subtotal, Professional/Technical Services

		UNIT			
DESCRIPTION	QTY	COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% O&M Activities Subtotal				\$1,200	OSWER 5-8: Assume 10% of O&M Activities Subtotal
w/Contingencies)					including contingencies
Technical Support (15% O&M Activities Subtotal				\$1,800	OSWER 5-8: Assume 15% of O&M Activities Subtotal
w/Contingencies)					including contingencies

TOTAL, PERIODIC COSTS \$15,000

\$3,000

Abbreviations:

B.C.Y. = bank cubic yards Hr. = hour L.S. = lump sump S.F. = square feet L.C.Y. = loose cubic yards Mo. = month C.Y. = cubic yards S.Y. = square yard Ea. = each L.F. = linear feet M.S.F. = thousand square feet

1. "Means" refers to one of the following:

RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition. RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:

ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition, ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

- 3. Average labor rate of \$124/hr assumes primarily office-based labor. Average labor rate of \$99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
- 4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
- 5. The following assumptions were used for the former mill tailrace quantity estimates:
  - a.) We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y. volume.
  - b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
  - c.) We assumed 1 cubic yard of dredged and dewatered sediments weighs approximately 1.75 tons.
- 6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
- 7. All subtotals and total are rounded to 2 significant numbers. The number presented initalics to the right of rounded subtotals is the unrounded summed value.